BIGGEST ISSUE EVER!

DECEMBER 2002
ISSUE 146

Better Homes and Gardens®

WOOD®

BONUS
SAW BLADE POSTER

16 WAYS TO $AVE MONEY buying wood p. 58

arts & crafts rocking chair

Create a classic from our crystal-clear plans p. 68

TOOL REVIEWS:

- Sharpening Systems p. 84
- 12" Disk Sanders p. 65

8 GREAT PROJECTS

something for everyone

MAKE OAK GRAIN POP!

IN 3 EASY STEPS

www.woodonline.com

Display until January 21, 2003

U.S.A. $5.95

12>

0 72440 14072 1

WOOD MAGAZINE SHOP TESTED APPROVED™

This seal is your assurance that we build every project, verify every fact, and test every reviewed tool in our workshop to guarantee your success and complete satisfaction.

contents

WOOD® magazine December 2002, Issue 146

PROJECTS

8 **cherry wall mirror**
26 **laminate-cutting auxiliary fence**
30 **suet bird feeder**
52 **routed-inlay serving tray**
56 **wood-and-tile trivets**
62 **turned oil-candle trio**
68 **arts & crafts rocking chair**
96 **dragon pull toy**

TECHNIQUES

20 **how to showcase oak**
Cut and assemble parts so the ray fleck is front and center in your next project.

22 **make quartersawn figure pop**
Discover the finishing tricks for emphasizing oak's fabulous grain patterns.

78 **lessons in bent lamination**
Make curved project parts the easy way—using clamps, glue, and a form.

TOOLS & MATERIALS

16 **the scoop on panel-raising bits**
Learn how horizontal and vertical bits differ, and which best suits your needs.

65 **12" disc sanders face off**
Five machines play rough as they compete for the top spot in our test.

84 **8 water-cooled sharpeners**
Get the edge on a whole range of cutting tools with one of these versatile models.

100 **shop-proven products**

FEATURES

50 **cherry: an american classic**
Become an expert on this popular species.

58 **16 ways to save cash buying wood**

90 **ken schubert's bentwood beauties**
Let a pro show you his method for fashioning wood into attractive oval trays.

DEPARTMENTS

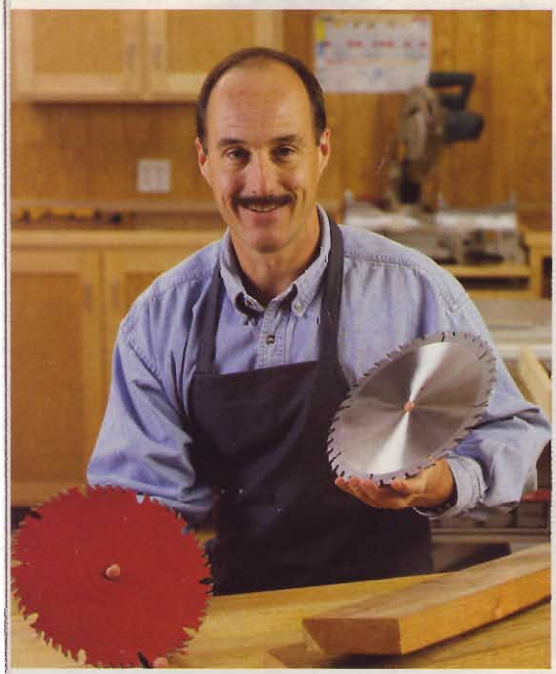
4 **editor's angle**
6 **sounding board**
14 **short cuts**
28 **at your service**
34 **shop tips**
44 **ask *WOOD***
128 **what's ahead in our next issue**

editor's angle

Season's Greetings from the *WOOD* shop

Okay last-minute gift makers, it's time to get serious about the holidays. If you're looking for a few quality projects you can build in a hurry, don't worry. We've wrapped some special surprises into this issue with you in mind.

It really is better to give than to receive. No wonder, then, that so many of us log extra-long hours in the shop this time of year. We do it for the priceless payoff we receive when that special someone opens a gift made with our own hands, and then rewards us with a beaming smile.



Hmmm, would a 40-tooth general purpose or 50-tooth combination blade work best for ripping and crosscutting 1½" redwood? The answer lies in the poster in the center of this issue.

That's why our last issue had so many great projects for gift giving. In this issue, with the holidays almost upon us, you'll find projects you can make in an evening or weekend, such as the wall mirror on *page 8*, the trivets on *page 56*, and the oil candles on *page 62*.

Our gift to you. In the center of this magazine you'll find a special surprise produced by the *WOOD* staff and sponsored by Freud. Our goal with this bonus saw-blade poster was to publish an indispensable reference deserving of a place on your workshop wall. The poster quickly tells you what type of blade works best for nearly any cut and material, and does so in a format that eats up little wall space.

Of course, most of us can't afford 13 different blades to ideally handle every possible task, so the poster also includes a second-choice blade for most cuts. Personally, I get by pretty well with 24-, 40-, and 80-tooth blades, but I'll turn to this poster the next time a finicky wood or special material poses a problem.

And if you'd like to buy yourself a present ... then allow me to slip in a plug for *WOOD Extra*, our brand-new online magazine. The first two issues have the latest scoop on all of the newest tools unveiled to our editors at trade shows and press conferences this past summer. Each issue of *WOOD Extra* also has six projects — some just perfect for gift making. Go to woodextra.com for more information.

Don't forget to enter your best birdhouse or feeder in our "For the Birds" contest. You'll find all of the details and prizes on pages 96 and 97 of the October issue (144), or on the Web at woodonline.com. The entry deadline is February 1, 2003, so don't delay.

Happy Holidays,

Bill Krier

Better Homes and Gardens®
WOOD®
December 2002 • Vol. 19, No. 8 • Issue No. 146

Editor-in-Chief **BILL KRIER**
Executive Editor **JIM HARROLD**
Managing Editor **MARLEN KEMMET**
Features Editor **DAVID STONE**
Products Editor **DAVE CAMPBELL**
Projects Editor **JAN SVEC**
Projects Editor **OWEN DUVALL**
Techniques Editor **JIM POLLOCK**
Senior Design Editor **KEVIN BOYLE**
Design Editor **JEFF MERTZ**
Master Craftsman **CHUCK HEDLUND**
Production/Office Manager **MARGARET CLOSNER**
Administrative Assistant **SHERYL MUNYON**
Photographer **MARTY BALDWIN**
Illustrators **LORNA JOHNSON, ROXANNE LeMOINE, TIM CAHILL, MIKE MITTERMEIER**
Technical Consultants **RICH BRIGHT, JEFF HALL, PHILLIP GOODWIN, GARRY SMITH**
Contributing Craftsman **JIM HEAVEY**
Proofreaders **JIM SANDERS, BARBARA KLEIN**

Art Director **KARL EHLERS**
Associate Art Director **GREG SELLERS**
Assistant Art Director **CHERYL A. CIBULA**

Publisher **MARK HAGEN**

Advertising Office: 333 N. Michigan Ave., Suite 1500, Chicago, IL 60601 Phone: 312/853-2890 Fax: 312/580-7906
Sales and Marketing Assistant **LARA KALLAL**
Mail Response Manager **CAROLYN DAKIS**
Account Executive **RON GOLMINAS**
Account Executive **NEIL KIRBY**
Account Executive **JOHN THORNBURGH**
Detroit, Phone: 248/356-1149 Fax: 248/356-8930
Account Executive **PAT TOMLINSON**
Northeast, Phone: 212/551-7043 Fax: 212/551-7192
Southeast: Lagomarsino, Dempsey & Dennis, Inc.
2951 Piedmont Rd., NE, Suite 100, Atlanta, GA 30305
Phone: 404/261-5400 Fax: 404/261-5404

Group Marketing Director **CATHY E. SMITH**
Senior Marketing Services Manager **ALEXANDER D. CLARKSON**
Phone: 212/551-7090 Fax: 212/551-7192
Senior Promotion Designer **SARAH DIBELLA**

Group Publisher **STEPHEN B. LEVINSON**

Associate Business Director **CRAIG FEAR**
Senior Product Manager **RICK GROW**
Advertising Operations Manager **PAT HENDERSHOTT**
Consumer Marketing Director **JULIE MARTIN**
Consumer Marketing Manager **DAVE HONOLD**

Vice President/Publishing Director **WILLIAM R. REED**

MEREDITH PUBLISHING GROUP
President **STEPHEN M. LACY**
Magazine Group President **JERRY KAPLAN**
Group Sales **MICHAEL BROWNSTEIN**
Creative Services **ELLEN DELATHOUDER**
Manufacturing **BRUCE HESTON**
Consumer Marketing **KARLA JEFFRIES**
Finance and Administration **MAX RUNCIMAN**

Meredith CORPORATION
WILLIAM T. KERR, Chairman and Chief Executive Officer
E.T. MEREDITH III, Chairman of the Executive Committee

©Copyright Meredith Corporation 2002
All rights reserved. Printed in the U.S.A.

Better Homes and Gardens® WOOD® magazine (ISSN-0743-894X) is published seven times a year in March, May, June/July, September, October, November, and December by Meredith Corporation, 1716 Locust St., Des Moines, IA 50309-3023. For subscription questions call **800/374-9663**. Periodicals postage paid at Des Moines, Iowa, and additional mailing offices. Better Homes and Gardens trademark registered in Canada and Australia. Marca Registrada en México. **ONE-YEAR SUBSCRIPTION PRICES:** U.S. and its possessions, $28; Canada, $41; other countries, $49. Canada Post Publications Mail Sales Product Agreement No. 40069223. Canadian BN 12348 2887 RT. **CANADIAN RETURN ADDRESS:** *Better Homes and Gardens WOOD* magazine, 2744 Edna Street, Windsor, Ontario, N8Y 1V2. **POSTMASTER:** Send address changes to *Better Homes and Gardens WOOD* magazine, P.O. Box 37439, Boone, IA 50037-0439.

sounding board

Our bulletin board for letters, comments, and timely updates

Solar kiln plan leads to career as sawyer

Back in June 1994 (issue 70), you showed a diagram of a wood-drying solar kiln (see photo, *below*). In a way, that article changed my life and allowed me and my wife, Patty, to start a new woodworking business.

Several years ago, I hired a friend with a portable mill to cut lumber from trees on our farm. I needed to dry the lumber, so I ordered plans and built your kiln.

The kiln, which I built on skids for portability, came out great. My first attempt at drying, though, was a disaster. Heavy rains caused one corner of the kiln to settle, so the whole load twisted and warped as it dried.

I fixed and leveled the kiln, and cut a batch of new stickers. The next load was outstanding! I dried all of my lumber, and some for a few customers.

The next year, I leased my friend's mill and dried 6,000 board feet of lumber for myself and for a growing number of customers.

In November of 1998, I bought my friend's sawmill, *right*, and his dehydration kiln to keep up with requests for custom-drying.

As my volume of work increased, I needed more kiln space. In 2001, we built a 3,000-board-foot solar kiln, shown *below*, based on your original design. It works great.

A Wood-Mizer bandsaw mill, located in an open-sided shed, makes Mark Shupe's setup complete, allowing him to cut logs into lumber before kiln drying.

Mark Shupe now dries enough stock to fill his original *WOOD*® magazine solar kiln, left; his new, super-size solar unit, right, that holds 3,000 board feet of lumber; and a commercial dehydration kiln, not shown. Great job, Mark. Keep that beautiful lumber coming.

What was just a hobby has become a business. We stay booked for months at a time with custom milling and drying. It's all thanks to that one simple article.

—Mark Shupe, Toledo, Ill.

***Note**: To order plans for our 1,000-board-foot-capacity solar kiln, a copy of the original article, a materials list, and information about drying, send $9.95 to: Solar Kiln, WOOD PLANS®, PO Box 349, Kalona, IA 52247; or call 888/636-4478.*

Promote your woodworking event online through WOOD Extra

Have a large-scale woodworking event coming up in your area? Let the world know using the calendar at *WOOD Extra*, our new online woodworking magazine.

Whether it's a woodworking gallery opening, a craft show with a strong woodworking presence, or an event for a large club, we'll post it free. Then we will make it available to our *WOOD Extra* subscribers using an interactive regional map.

To get your event posted online, send us the event name, location, dates, and contact information (both telephone and e-mail, if possible). You can reach us by e-mail at wecalendar@meredith.com, or you can mail the information, as far in advance as possible, to: WOOD Extra Calendar, 1716 Locust St., GA-310, Des Moines, IA 50309-3023.

To become a *WOOD Extra* subscriber, go to www.woodextra.com.

Tool-test update

•7 mid-priced bandsaws (issue 144, p. 78):

The horsepower rating for the Jet JWBS-16 is 1½ hp.

Get article information online

Do you have a question on a project? You'll find a complete listing, from issue 1 through today, of all known updates to past *WOOD* magazine projects on our Web site at **www.woodmagazine.com**. Just click on *WOOD* magazine on the left side of the screen. Then select Editorial Extras from the options on the next screen.

Write Us!

Do you have comments, criticisms, suggestions, or maybe even a compliment specifically relating to an article that appeared in *WOOD*® magazine? Please write to:

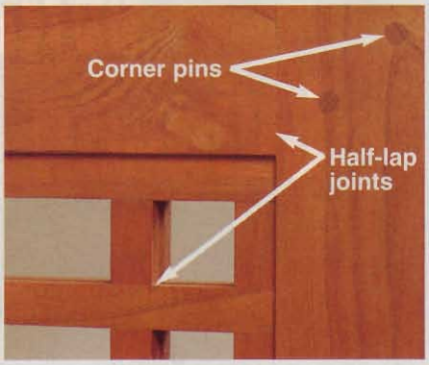
Sounding Board
***WOOD* magazine**
1716 Locust St., GA-310
Des Moines, IA 50309-3023

Or, if you prefer, you can send us an e-mail at **soundingboard@woodmagazine.com.**

Due to the volume of letters and e-mails we receive, we can respond to and publish only those of the greatest interest to our readers.

fresh-faced wall mirror

Fine trim and corner pins accent this traditional cherry frame.



Half laps join the frame members and trim pieces together. Decorative corner pins reinforce the frame's joints.

Here's a project that requires only a couple of evenings' effort but will look like it took many more. You'll learn how to simply form and attach the narrow trim, and to pin the half-lap joints at the frame's corners. This project requires limited investment in stock, too.

Note: For our project, we used a frameless 4mm×24×36" mirror (23⅞×35⅞" actual size) which we found at a home center.

For the items needed to build this project, see the Cutting Diagram and Materials List on *page 11*.

Start with the frame

1 Cut the stiles (A) and the rails (B) to the sizes listed in the Materials List. On the back of the stiles, mark centerpoints for 1" counterbores to receive the fender washers that hold the mirror in place, where dimensioned on **Drawing 1**. Using a 1" Forstner bit, drill ⅛"-deep holes at the centerpoints. Then, drill a 3/32" pilot hole ½" deep centered in each hole.

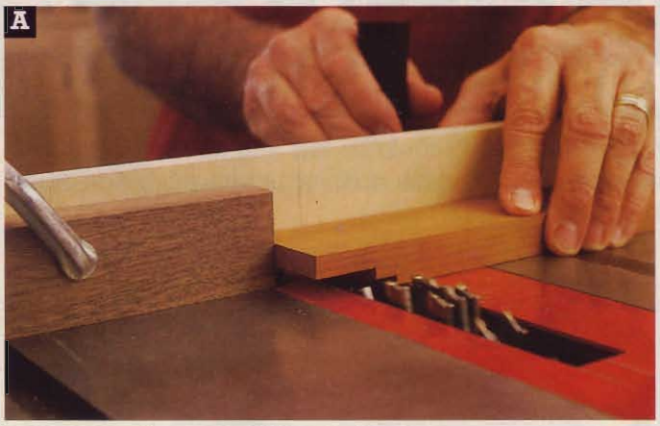
2 Cut or rout a ⅜" rabbet ⅜" deep along the back inside edge of the stiles and the rails, where shown.

3 Cut 1⅝" half laps on the ends of the stiles (A) on their back face and mating 2" half laps on the front face of the rails (B), where detailed on **Drawing 2**. Refer to **Photo A** for the setup we used. (We made test cuts in scrap first to ensure flush-fitting joints.)

4 Glue and clamp the stiles and rails together to form the frame, and check for square. With the glue dry, sand the frame's edges and faces flush.

5 Mark the centerpoints for the ¼" dowel holes on the front of the

continued on page 9



Attach an auxiliary extension to your miter gauge, clamp on a stopblock, and cut the half laps on the stiles and rails, making several passes to complete the joint.

SHOP TIP

How to safely form grooves in narrow parts

When cutting grooves in narrow parts, such as the trim in our project, keep your fingers out of harm's way by using feather boards to hold the stock flush to the saw fence and the table. Also, install a zero-clearance insert to support the stock so it can't fall into the saw. Use a sacrificial stick to push the workpiece through the cut.

frame at each corner, where dimensioned on **Drawing 2**. Drill ¼" holes through the frame at the marked locations. From a ¼" cherry dowel, cut eight pieces 13/16" long. Apply glue in the holes, and insert the dowels from the front of the frame, centering them so 1/32" projects from each face of the frame. For the best appearance, align the dowels' grain with that of the surrounding wood. With the glue dry, sand the dowels flush to the frame.

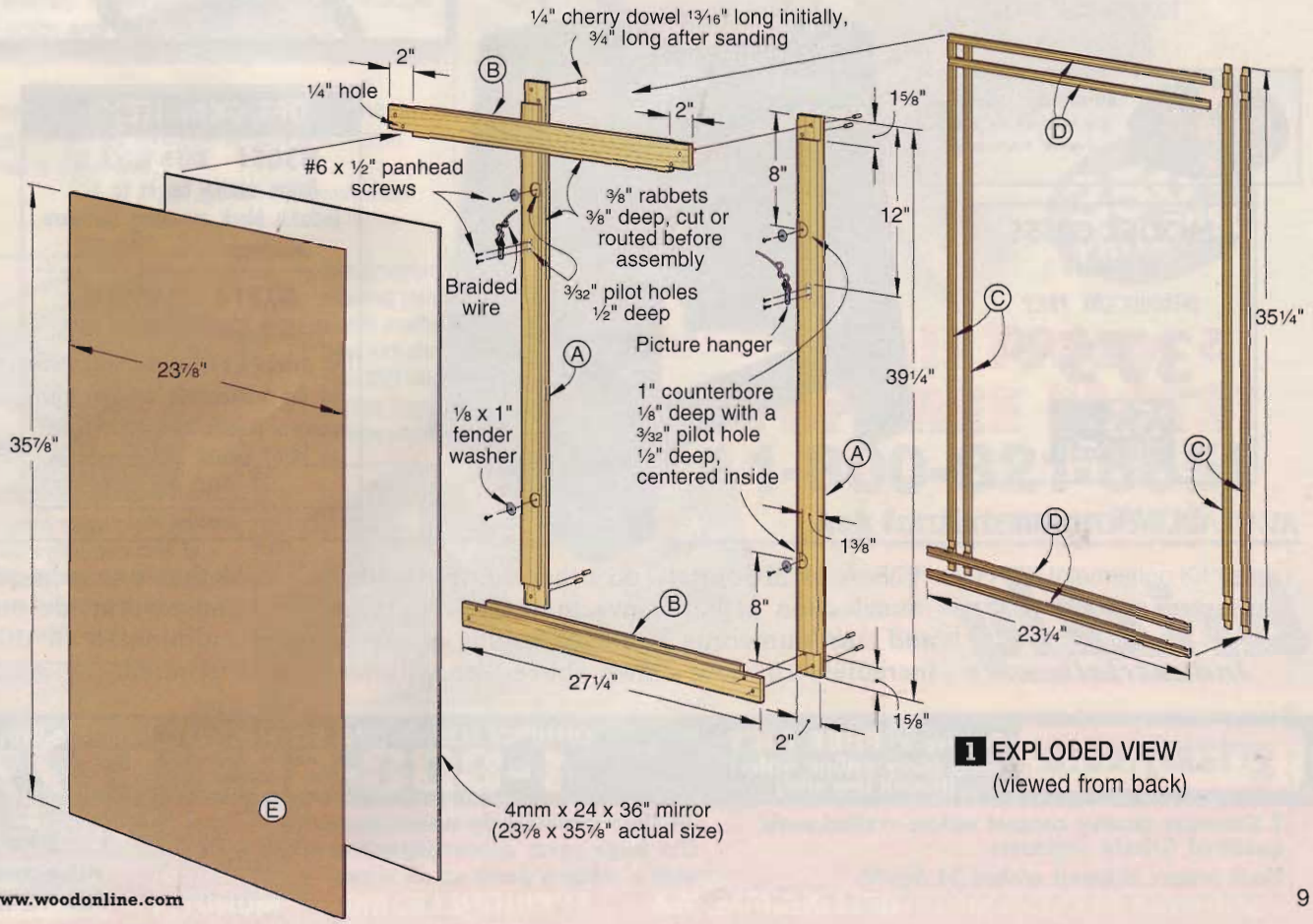
Next, make the flattest trim you can

1 From ¼"-thick stock, cut the vertical and horizontal trim pieces (C, D) to size to fit the frame opening. Use the flattest and straightest stock you have to minimize the amount of deflection needed to align the trim during assembly.

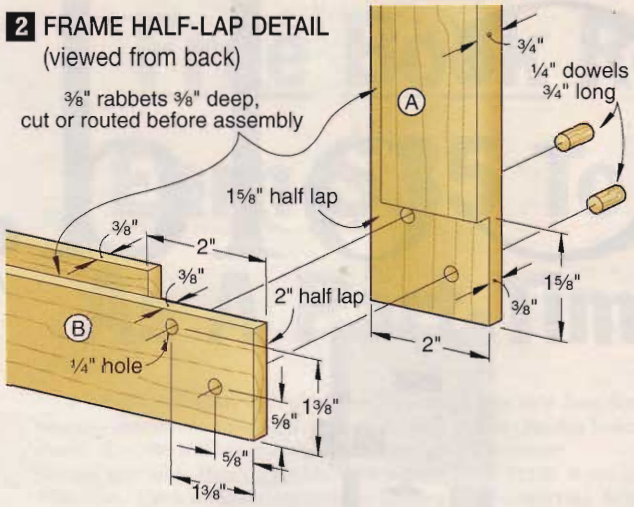
2 Referring to **Drawing 3** and to the **Shop Tip**, *above*, cut a centered ¼" groove 1/16" deep on the back of the trim pieces to receive silicone for attaching the trim to the mirror.

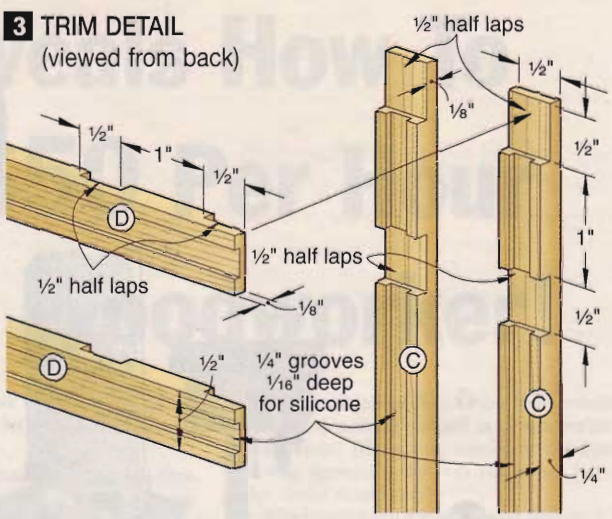
3 Using a dado blade, cut the ½" half laps in the trim, where dimensioned on **Drawing 3**. Use a stopblock on your miter gauge's auxiliary extension to position the cuts in the trim. Now, glue and clamp the trim together.

continued on page 11



1 EXPLODED VIEW
(viewed from back)





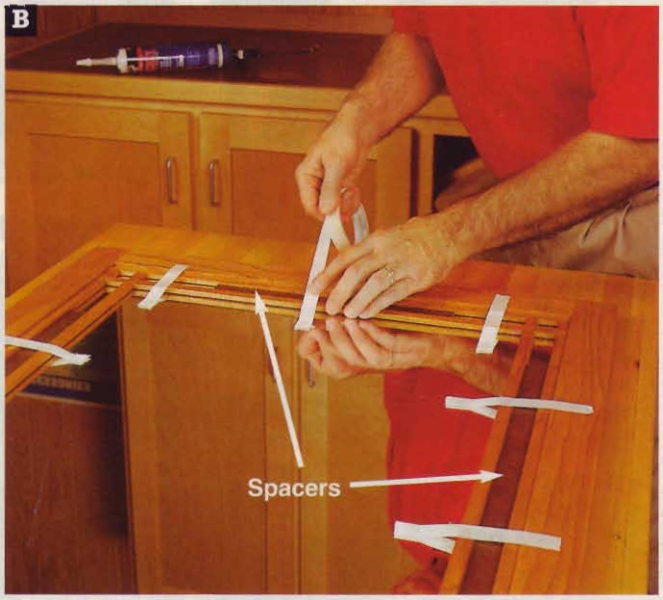
Add the finish, and complete the assembly

1 Finish-sand the frame and trim, including a light sanding of sharp edges, to 220 grit. Apply three coats of a clear finish, sanding to 320 grit between coats. (We used aerosol lacquer.)

2 From 1/8" hardboard, cut the back (E) to size. Place the frame front side down on a pad (a router mat works fine) on your workbench. Install a mirror and the back in the frame. Secure by screwing a 1/8×1" fender washer in each of the counterbores, where shown on **Drawing 1**.

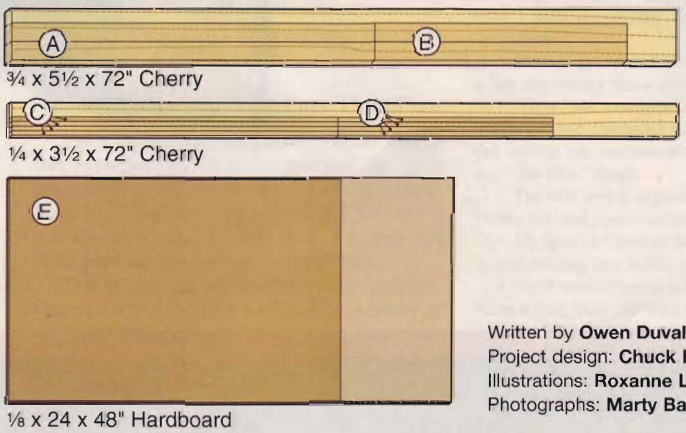
3 From 1/8" hardboard, cut two 1×12" spacers and two 1×24" spacers. Turn the frame over so its front side is up. Place a few dabs of silicone in the 1/4" grooves on the back of the trim assembly. Install the trim assembly inside the mirror frame. Insert the 12"-long spacers between the horizontal trim pieces (D) at the top and bottom of the assembly, and insert the 24"-long spacers between the vertical trim pieces (C) on the sides. Center the spacers end to end in the openings, and secure as shown in **Photo B**. Let the silicone cure for 24 hours. Then, peel off the tape, and remove any silicone squeeze-out using a safety razor blade.

4 Refer to **Drawing 1** for the location of the picture hangers. (Make sure that the hangers and braided wire are rated for a minimum of 21 pounds.) Mark and drill the mounting screw holes. Then screw the hangers in place. Finally, attach a piece of braided wire between the hangers, and hang your masterpiece.



With the trim and spacers held flush to the frame and flat against the mirror, apply masking tape to keep the trim in position while the silicone cures.

cutting diagram



materials list

Part	FINISHED SIZE T	W	L	Matl.	Qty.
A stiles	3/4"	2"	39 1/4"	C	2
B rails	3/4"	2"	27 1/4"	C	2
C vertical trim	1/4"	1/2"	35 1/4"	C	4
D horizontal trim	1/4"	1/2"	23 1/4"	C	4
E back	1/8"	23 7/8"	35 7/8"	H	1

Materials key: C–cherry, H–hardboard.

Supplies: 1/8" hardboard; 1/8×1" fender washers (4); #6×1/2" panhead screws (8); clear silicone caulk; picture hangers (2) and braided wire, rated for a minimum of 21 pounds; 1/4" cherry dowel, 10" long; 4mm×24×36" mirror (23 7/8×35 7/8" actual size).

Blades and bits: Dado blade, 1" Forstner bit, 3/8" rabbet bit.

Written by **Owen Duvall**
Project design: **Chuck Hedlund**
Illustrations: **Roxanne LeMoine; Lorna Johnson**
Photographs: **Marty Baldwin**

short cuts

News and notes from the woodworking world

GREAT IDEAS FOR YOUR WOODWORKING CLUB

Vancouver-area craftsmen show their stuff

So what do Canadian woodworking clubs do for fun? Plenty. Recently, *WOOD®* magazine's executive editor Jim Harrold traveled to the west coast of British Columbia to find out firsthand.

In Victoria, Vancouver Island, he seized the chance to see a collection of team-designed kitchen and dining room projects made by members of the Vancouver Island Woodworkers Guild. (See *above right.*) The club plans to sell the items by silent bid at a local shopping mall, and donate the proceeds to the Greater Victoria Police Victim Services.

Across the Strait of Georgia, he caught up with the Pacific Woodworkers Guild in Vancouver where he attended a club meeting and viewed the entries for the annual 2×4 Challenge. Here, participating club members went to work designing and building projects from a single piece of wood that measured no more than 2×4×96". As you can see, *right*, the end results proved quite imaginative. Nice work, guys.

Vancouver Island Woodworkers Guild officers (from left) John Miller, Scott Reid, and Michael Kattler show off team-designed/team-built items made by club members on behalf of a local charity.

Wow! Pacific Woodworkers Guild members (from left) Dan Lemire, Bill Ophoff, and Steve Hansen, built each of these projects from 2×4×96" stock.

Lineman's projects create quite a buzz

Britt Comer, a lineman for a Washington State electrical utility company, wanted to use his woodworking talents to create something in wood that represented his trade. The end result: a tool belt complete with lineman's tools, and line spurs used for climbing poles, shown *left* and *below*. "The toughest part was trying to get wood to look like leather," Britt says. "I found that Pacific yew gave me the look that was needed."

Other woods in the designs include black walnut for the pouch, padauk for tool handles, purpleheart for the pliers, wenge for the tape, alder for the back strap and D-ring, and oak for the wire-skinning knife.

Washington state lineman Britt Comer's projects realistically portray the tools he works with every day.

Photographs: Mike McGregor; Scott Reid; Greg Schurman; Dan Gindling

WOOD goes to The Woodworking Shows

If you have this growling hunger for woodworking tools, skills, and a great time, then don't miss The Woodworking Shows when this three-day event makes a stop in your neck of the woods. While attending the show, be sure to sign up for one or more of the "Mastering Woodworking" seminars sponsored by *WOOD* magazine and the Marc Adams School of Woodworking. In these classes, well-known craftsmen from around the country teach techniques that promise to improve your woodworking.

In addition, take advantage of all of those incredible show specials, such as discounted tools, jigs, finish, and other great workshop products.

To learn more about the shows, see the ad on *page 111* of this issue. Or, check the online site at www.thewoodworkingshows.com for a complete list of show dates and times.

Furniture maker Graham Blackburn demonstrates putting a keen edge on a plane iron during a Mastering Woodworking seminar.

panel-raising bits: horizontal vs. vertical

Consider cost, convenience, and safety when deciding which style is right for you.

The horizontal bit (left) cut the end of the panel; the vertical bit (right) cut the edge. Both bits produce the same profile, but that's where the similarities end.

Outfitting your projects with handsome raised panels became less intimidating—and more affordable—with the introduction of vertical panel-raising bits a few years ago. Unlike traditional horizontal bits that you use to rout the profile with the panel face-down on a router table, with vertical bits you machine the panel standing on edge.

Also, you can safely run vertical panel-raising bits in 1½-hp and fixed-speed routers, whereas a horizontal bit requires a variable-speed router of at least 2¼ hp. (Check your router's owner's manual for the maximum bit diameter the router can safely accommodate.) The trade-off for these benefits comes at setup time and in the quality of the finished cut.

Which should you choose? Here's how horizontal and vertical panel raisers compare in key performance areas:

Vertical bits

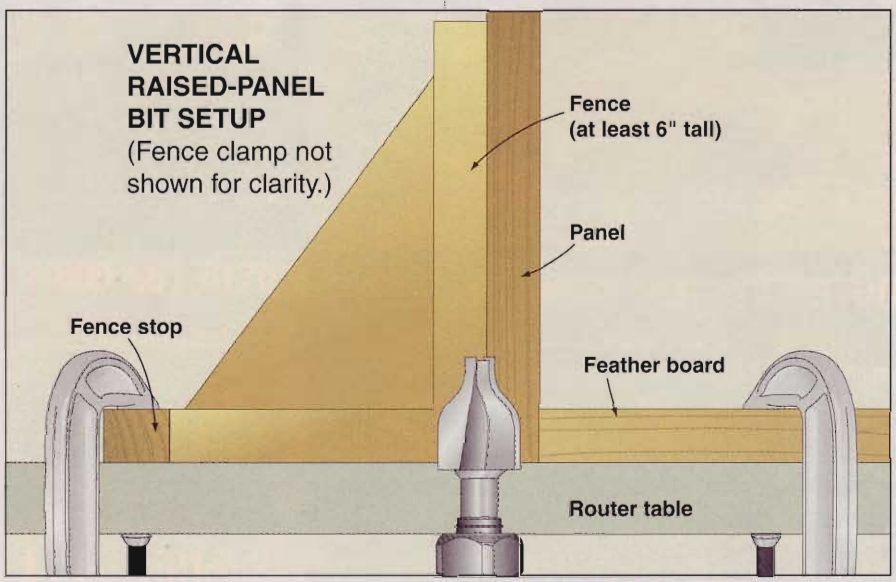
- Price: $40-$80
- Maximum speed: 18,000–20,000 rpm

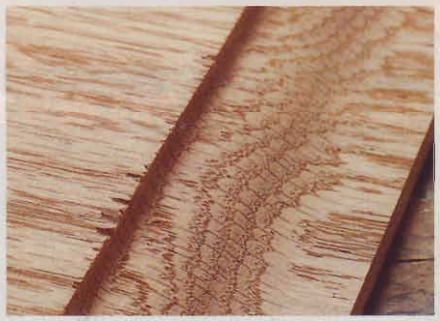
High points

- ⇧ Less of the bit is exposed, reducing likelihood of kickback.
- ⇧ The bit can be used in 1½-hp routers with only a few progressively deeper cuts.

Low points

- ⇩ You need a tall auxiliary fence and feather boards on the infeed side of the table to keep the panel flat against the fence when cutting. (See the "Vertical Raised-Panel Bit Setup" drawing.) And the on-edge feed orientation can be awkward, especially with large panels.
- ⇩ With no pilot bearing to help locate the fence, you can't raise curved or arch-topped panels without a special curved fence to guide the workpiece.
- ⇩ Cross-grain cuts in coarse-grain woods, such as red oak, tend to tear out along the face of the panel, as shown *below.*





The lifting action of a vertical panel-raising bit tends to produce tear-out on cross-grain cuts.

Continued on page 18

Horizontal bits

•Price: $40–$130

•Maximum speed: 10,000–12,000 rpm (Bits smaller than 2¼" in diameter can go up to 18,000 rpm.)

High points

- Requires simple setup using your existing router-table fence (see the "Horizontal Raised-Panel Bit Setup" drawing).
- Routing with the panel facedown on the router table feels natural and comfortable, and requires no additional hold-downs.
- Because of the bearing guide, you can machine curved or arched panels without additional fixtures.
- Cross-grain tear-out, if any, occurs on the outside edges of the panel, where it will be hidden by the grooves in the rails and stiles.

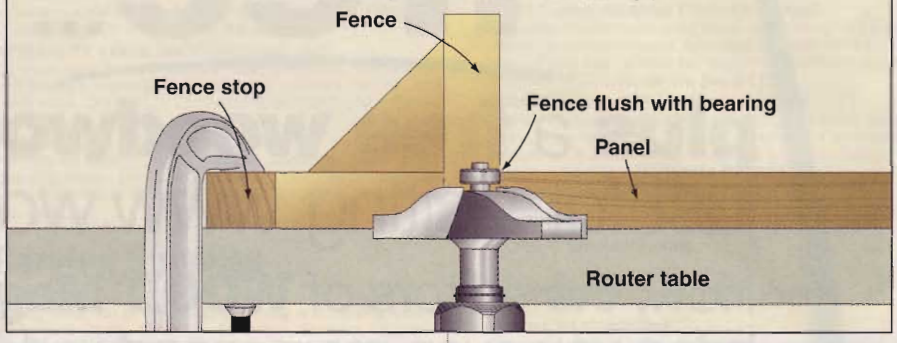
Low points

- Not all manufacturers make both styles of bit, but those that do charge 20–30 percent more for a horizontal bit than for the same-profile vertical bit.
- Large diameter requires slower router speeds and is more prone to dangerous kickback. You also need a large bit opening in your router table.

More points

- Some horizontal panel raisers have "back cutters" on the same bit. These cutters machine the back of the panel at the same time as the front, making both the panel front and back flush with the face frame.

HORIZONTAL RAISED-PANEL BIT SETUP
(Fence clamp not shown for clarity.)



5 tips for success with either bit

Regardless of which bit you choose, do the following to get better results:

1 Use ½"-shank bits. No matter what the size or profile of the panel-raising bit, you're still removing a lot of wood, and the beefier shank makes the cut safer and more accurate.

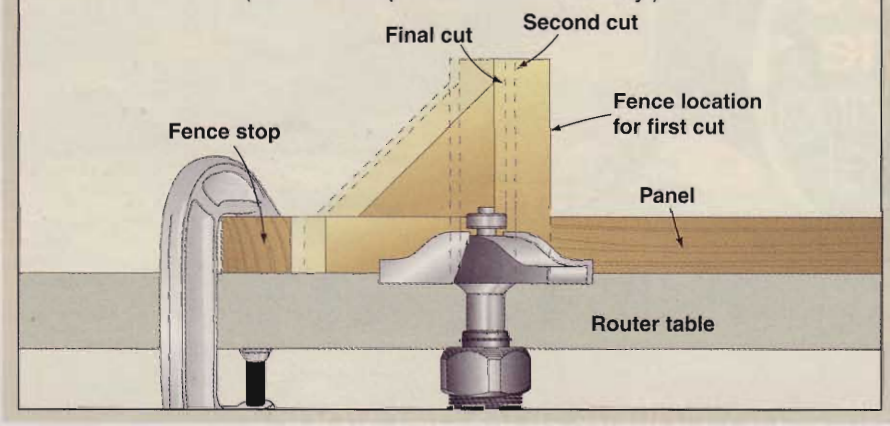
2 Plane all stock—including plenty of extra for test cuts—to the same thickness. The front of the panel is your reference surface for machining, but it's what's left afterward that controls the fit in the frame. Even a tiny difference in thickness can frustrate you with a panel that rattles.

3 Test-fit the entire length of the panel. Resist the temptation to check the fit of the panel-to-frame joint with only a short scrap of panel stock because it might not tell the whole story. If a full length of panel scrap slides easily in a full length of rail-and-stile stock, you've got a good fit between the parts.

4 Once you're satisfied with the fit, lock the cutting height and clamp a fence stop to the table. Move the fence forward so you'll remove only about half of the material in the first pass. (See the "Three-Step Cutting for Raised Panels" drawing.) Slide the fence back almost to the stop for the second pass, then all the way back to the stop for the final cleanup pass.

5 Rout the end grain first. That way, any blow-out at the end of the cut will be machined away when you make the edge cuts.

THREE-STEP CUTTING FOR RAISED PANELS
(Fence clamp not shown for clarity.)



The bottom line

A horizontal raised-panel bit will always give you a cleaner cut than a vertical bit; so if you have a powerful, variable-speed router, spend a little extra money and go for it. If you have a lower-powered router but still want to make raised panels, a vertical bit makes a good alternative.

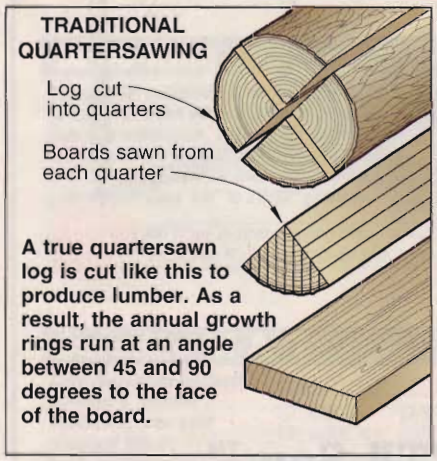
how to showcase

quartersawn oak

Select boards with striking "ray fleck," then put that figure on display with careful planning.

Can you get an exotic look from domestic wood? You certainly can with quartersawn white oak, as shown here.

Quartersawn lumber offers stability and straight face grain, and when the wood is white oak, you get a bonus. Random, light-colored streaks known as "ray fleck" decorate the surface in a unique and beautiful way, as you can see *above right* on an arm of the Arts and Crafts chair that we show you how to build on *page 68*.



A true quartersawn log is cut like this to produce lumber. As a result, the annual growth rings run at an angle between 45 and 90 degrees to the face of the board.

The traditional means of quartersawing is shown *above*. This method produces the most ray fleck possible from a given log. Whenever you consider building a project with quartersawn white oak, keep these points in mind:

• **Avoid overkill.** Standout figure works best on a big stage. If you're making a picture frame from narrow pieces, for example, most ray flecks will look out of proportion. Save your quartersawn white oak for a chair, table, or cabinet.

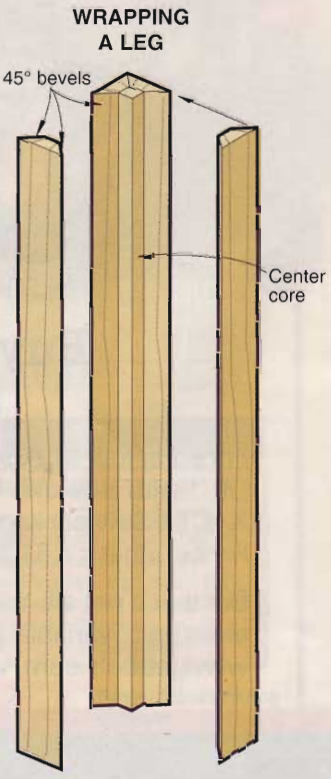
• **Buy wisely**. Take your time at the lumber store to find boards with interesting figure. If you need thick pieces, and want to avoid glue lines, you're in luck: Recently, 8/4 quartersawn white oak has become more readily available on the consumer market.

• **Plane before you plan.** The appearance of a quartersawn board changes slightly as you mill the surface, so take your lumber down to the desired thickness before you decide which boards are best for specific parts. Select boards with similar ray flecks for pieces to be edge-glued together.

• **Show it off.** A quartersawn board shows ray flecks only on its faces, not in the edge grain. Whenever possible, locate the board so that its face is more prominently displayed. Sometimes, you can get around the problem; see photo and drawing at *right* for an effective way to place face grain on all surfaces when you're building straight legs.

• **Consider orientation.** The appearance of ray fleck varies greatly depending on the viewing angle, and the difference is especially noticeable on rails and other horizontal parts. When you're choosing stock for such parts, wipe mineral spirits on a board's face to make the figure "pop," then hold the board at the height it will occupy in the finished piece. Check the appearance. Flip it end-for-end and look again. If one way is clearly better, mark the board so that you can shape it and install it for the maximum visual effect.

Here's how to spread the figure to all four sides of a straight leg. Build the leg with four mitered pieces and a center core, as shown in the illustration.



make quartersawn figure POP

You've paid a premium for quartersawn white oak. Here's how to bring out its distinctive grain.

These samples of quartersawn white oak were finished (left) with shellac alone; (center) with dye, sanding, and then shellac; and (right) with dye, no sanding, and then shellac. Here, you'll learn to produce the look on the center board.

After building the Arts and Crafts rocking chair on *page 68*, we experimented with a number of ways to best bring out the distinctive ray-filled grain of its wood. Ultimately, we developed the simple but effective three-step method shown here. You can use it not only on quartersawn white oak, but on any highly figured wood, such as curly maple or flame birch.

1 Set the tone with aniline dye

Begin the process by applying aniline dye. These dyes are available in dry-powder or liquid-concentrate form. Choose a water-soluble aniline dye, and apply it with a disposable foam brush. Work from top to bottom, applying dye to one part at a time. As the dye in the brush is depleted, go back over each part to blend lap marks or areas where dye has pooled. You can blend areas even after the dye dries by brushing with a clean foam brush dampened with water.

Note: *If you have access to a spray gun you may want to experiment with alcohol-soluble dyes. Although they don't raise the grain like water-soluble dyes, we don't suggest brushing alcohol-soluble dyes onto large projects, such as the rocking chair. That's because they dry so quickly that you'll find it difficult to brush them on without leaving lap marks.*

2 Sand to bring out the figure

With the dye dry (allow 12 hours), lightly sand the surfaces with 220-grit sandpaper. Sand just enough to remove the dyed surface of the quartersawn wood's dense rays, while leaving the dye in the more porous parts of the grain, as shown. Sanding this way removes any raised grain, as well. Back your sandpaper with a firm sanding block to avoid sanding through the dye on corners and edges. Remove the dust using a shop vacuum or compressed air.

3 Now for the topcoat

You'll notice that the dyed surface that looked so rich when wet now looks dull and unappealing. Don't worry, applying a clear finish brings it back to life.

For easy coverage of all the rocking chair's ins and outs, we used an aerosol shellac, as shown. Shellac, readily available at hardware stores and home centers, has several advantages over other aerosol clear finishes. First, it thoroughly dries in less than one hour, so you can apply three light coats in an afternoon. Second, although you'll need to smooth rough areas, successive coats of shellac adhere by slightly dissolving the previous coat, so you don't need to sand between coats. And finally, shellac has low odor, so you can use it in your shop with moderate ventilation. Avoid water-based finishes because they will reactivate the dye and may cause it to run.

visit us for help 24 hours a day

• Find the best wood for your next project
Want to learn about more than 60 wood species? Try going to: www.woodmagazine.com/woodprofiles

• Choose from dozens of free woodworking plans
Pick from a plethora of plans for shop jigs, organizers, and helpers at www.woodmagazine.com/miniprojects

• Quickly find past *WOOD* magazine articles
Looking for that certain article that solves your current woodworking dilemma? Visit our recently updated searchable *WOOD*® magazine index at www.woodmagazine.com/index

• Get back issues and articles here
Order past issues of *WOOD* magazine at woodstore.woodmall.com or by calling 800/346-9663. Order early as many issues are sold out. For article reprints, send $5 per article (no phone orders), including issue and name of article, to *WOOD* Article Reprint Service, PO Box 349, Kalona, IA 52247, check or money order made payable to *WOOD* magazine.

• Subscription assistance
Need to notify us of an address change or get other help with your subscription services? Visit us online at woodmagazine.com/service, or call 800/374-9663 and press option 1, or write to *WOOD* magazine, PO Box 37439, Boone, IA 50037-0439. Please enclose your address label from a recent issue.

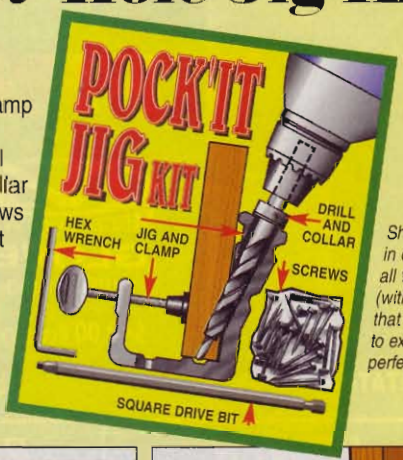
• Send comments to the editors
Send e-mail to woodmail@mdp.com, or call 800/374-9663 and press option 2, or write: Editor-in-Chief, *WOOD* magazine, 1716 Locust St., GA-310, Des Moines, IA 50309-3023.

Got a subscription question? Visit *WOOD*'s online service 24 hours a day at woodmagazine.com/subscript/

Finally... a COMPLETE Pocket-Hole Jig Kit!

OUR COMPLETE KIT INCLUDES:
- Pocket Jig with Clamp
- 3/8" Step Drill Bit
- Stop Collar for Drill
- Hex Wrench for Collar
- Square Drive Screws
- 6" Square Drive Bit

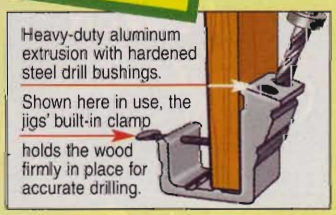
ALL THIS FOR ONLY $39.95 sugg. ret.
SEND FOR DEALER LIST



Shown here in our kit, are all the pieces (with your drill) that you'll need to execute perfect joinery.

USE THIS POCKET JIG KIT TO MAKE:

Face frames, table leg braces, flush joints plus corner and angle joints.

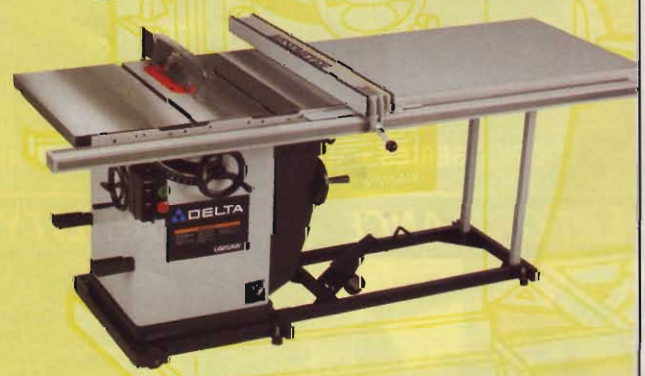


SIMP'L PRODUCTS Inc.
21 Bertel Avenue, Mount Vernon, NY 10550
Web Site: woodjigs.com E-Mail: info@woodjigs.com
Available through most fine woodworking outlets.

Circle No. 2085

Rockler.com
WOODWORKING SUPERSTORE

WIN A DELTA UNISAW



Register online at...
www.rockler.com/delta

No purchase necessary. See official rules at www.rockler.com/delta. Void where prohibited by law. Entries must be received by April 30, 2003.

Circle No. 661

fine-feathered dining
suet feeder

Birds flock to the high-energy nourishment provided by suet cakes. This good-looking feeder features a top that slides up the support cables, allowing you to add suet quickly and easily. Whether you build one for yourself or a dozen for gifts, you'll surely gain a flock of feathered friends.

Start with the top and sides

1 Cut the top (A) to size. (We used mahogany, but redwood, cedar, teak, or cypress would work.)

2 Raise your tablesaw blade 1½" above the surface of the saw table. Angle the blade 25° from vertical and away from the rip fence. Position the fence ¼" away from the bottom edge of the blade.

3 Fit your tablesaw with a zero-clearance insert. Using a pushblock or fence saddle to keep your fingers safely away from the blade, bevel-rip both ends of the top (A). Now, bevel-rip the edges of the top piece. Cut the two sides (B) to 3×8". To house the ½" hardware cloth (galvanized wire mesh), cut a pair of ⅛" grooves ¼" deep on the inside face of each, where shown on **Drawing 2**.

4 Mark the location, and cut a ¾" dado ¼" deep in each side (B) where dimensioned.

5 Locate and cut a pair of ⅜"-square mortises ⅛" deep on the outside face of each side (B), centering the mortises over the dado. (We cut ours with a mortising machine; you could also form them by drilling a hole and squaring the sides with a chisel.) Now, drill a 5/32" shank hole, centered in each mortise.

6 Mark the angled cuts along both edges of the sides (B) and the radiused bottom ends where dimensioned. Cut and sand to the marked lines to complete each side piece.

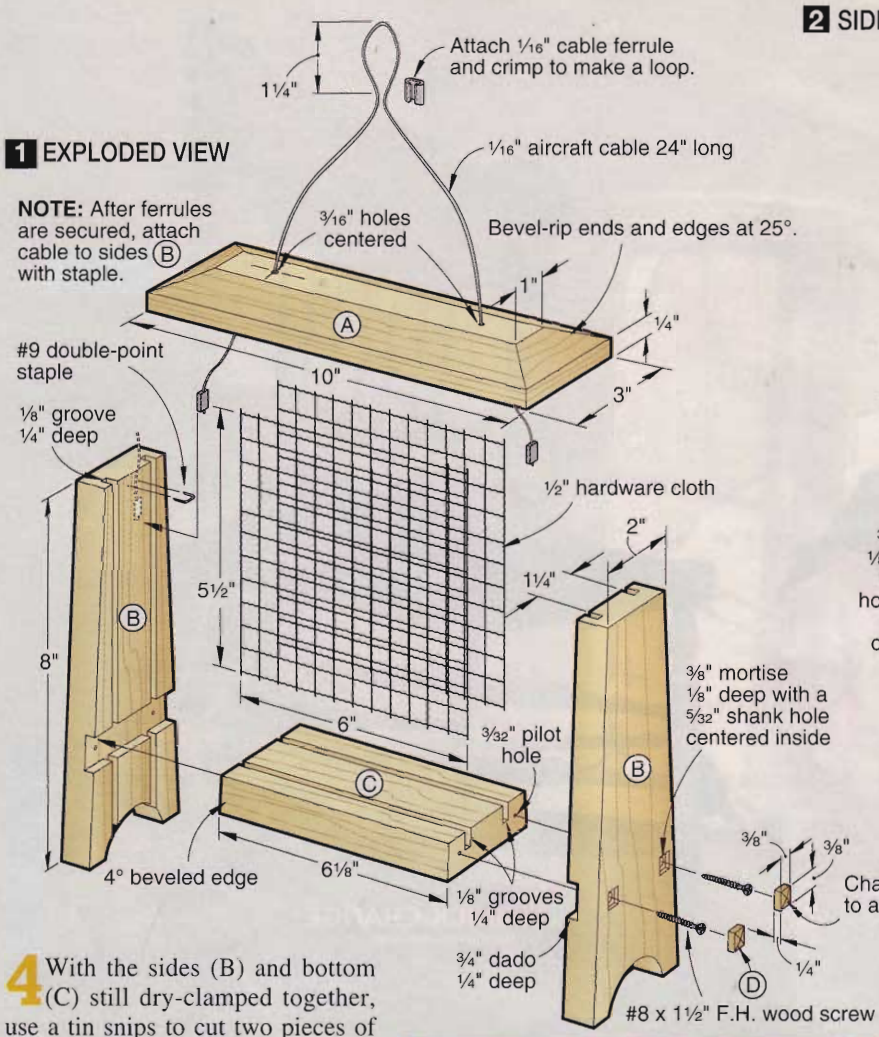
Add the bottom and prepare for assembly

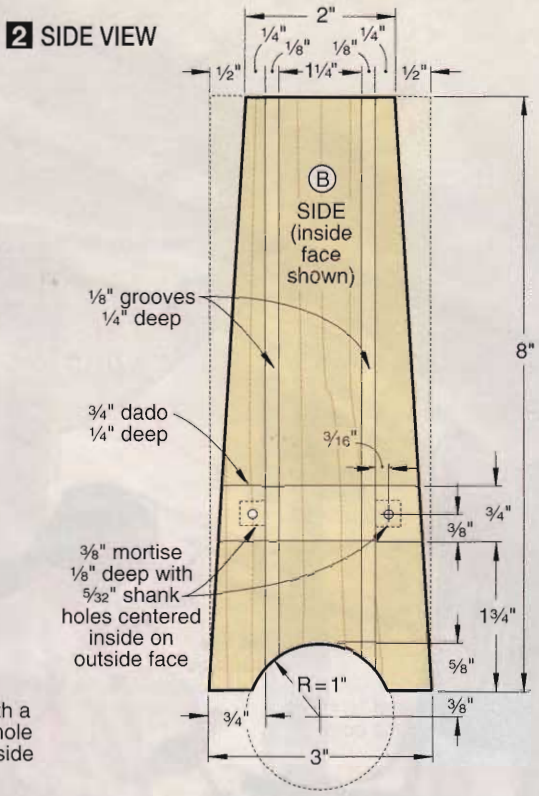
1 Cut the bottom (C) to size, bevel-ripping the edges at 4°. Take your time when ripping the edges—you want the beveled edges of C to be flush with the angled outside edges of B.

2 Cut two ⅛" grooves ¼" deep on the top face of C to align with the previously cut grooves in the sides (B).

3 Clamp (but no glue) the bottom (C) between the sides (B). Check for square. Center the top (A) on the assembly, and mark the hole locations for the cable on the bottom side of the top. The holes should be flush with the inside face of each side piece. Remove the top and drill the 3/16" holes where marked.

Continued on page 32





See more . . .
...Outdoor projects at
www.woodstore.woodmall.com/outfurac.html

4 With the sides (B) and bottom (C) still dry-clamped together, use a tin snips to cut two pieces of ½" hardware cloth to fit snugly into the ⅛" grooves. Next, using the shank holes in the mortises as guides, drill pilot holes 1½" deep into the ends of the bottom.

5 Remove the clamp, and disassemble parts B and C. Sand all four pieces.

Time for the cable and final assembly

1 Cut a piece of 1/16" aircraft cable to 24" long. (See the Buying Guide for a hardware-kit source.) Loop the top center section where shown on **Drawing 1**, and crimp a cable ferrule 1¼" from the top end of the loop. Slide the ends of the cable through the holes in the top (A). Then, crimp a ferrule onto each end of the cable where shown on **Drawing 1**.

2 Staple just above the ferrules on the ends of the cable to secure the cable to the inside face of each side (B), as shown in the photo, *above right*.

3 Cut a 10" length of ⅜"-square dark stock. (We used walnut. You could also use mahogany and a black permanent marker to stain the stock after sanding the chamfers.) Sand chamfers to form a point on both ends. (We did this on a disc sander.) Next, crosscut a ¼"-long plug (D) from each end of the stock. Repeat the process to form another set of plugs.

4 Fit the bottom (C) between the sides (B), aligning the grooves with those in the sides. Drive the screws through the previously drilled shank and pilot holes. Check for square. Glue one plug in each mortise to hide the screw head. Apply a clear exterior penetrating oil finish. Slide the two pieces of hardware cloth in place, insert a cake of suet, and hang at an inviting location.

With the pieces still separate, staple the ferruled ends of the cable to the inside face of the sides.

Written and designed by **Marlen Kemmet**
Illustrations: **Mike Mittermeier; Lorna Johnson**
Photographs: **Marty Baldwin**

materials list

Part	FINISHED SIZE T	W	L	Matl.	Qty.
A top	¾"	3"	10"	C	1
B sides	¾"	3"	8"	C	2
C* bottom	¾"	2¾"	6⅛"	C	1
D* plugs	⅜"	⅜"	¼"	W	4

*Pieces cut initially oversize; see instructions.

Materials Key: C–Choice (mahogany, redwood, cedar, teak, or cypress), W–walnut or other dark hardwood.

Supplies: See Buying Guide below.

Buying Guide

Hardware. ½x5½x6" hardware cloth (2 pcs.); 1/16" aircraft cable 24" long; 1/16" cable ferrules (3); #8x1½" flathead wood screws (4), and #9 double-point staple (2); kit no. WDBF1, enough for one feeder $6.99 ppd. in US. Kit no. WDBF5, enough for 5 feeders, $26.99 ppd in US. Miller Hardware, 1300 M.L. King Jr. Pkwy., Des Moines, IA 50314, or call 515/283-1724 for credit card orders or foreign shipping fees.

shop tips

Helping you work faster, smarter, and safer

Make mirror-image slots in a jiffy

If you've ever tried cutting slots that mirror one another (for example, the tambour-door tracks on a rolltop desk), you know it can be tricky to get them right. Here's how to make perfectly mating mirror-image slots.

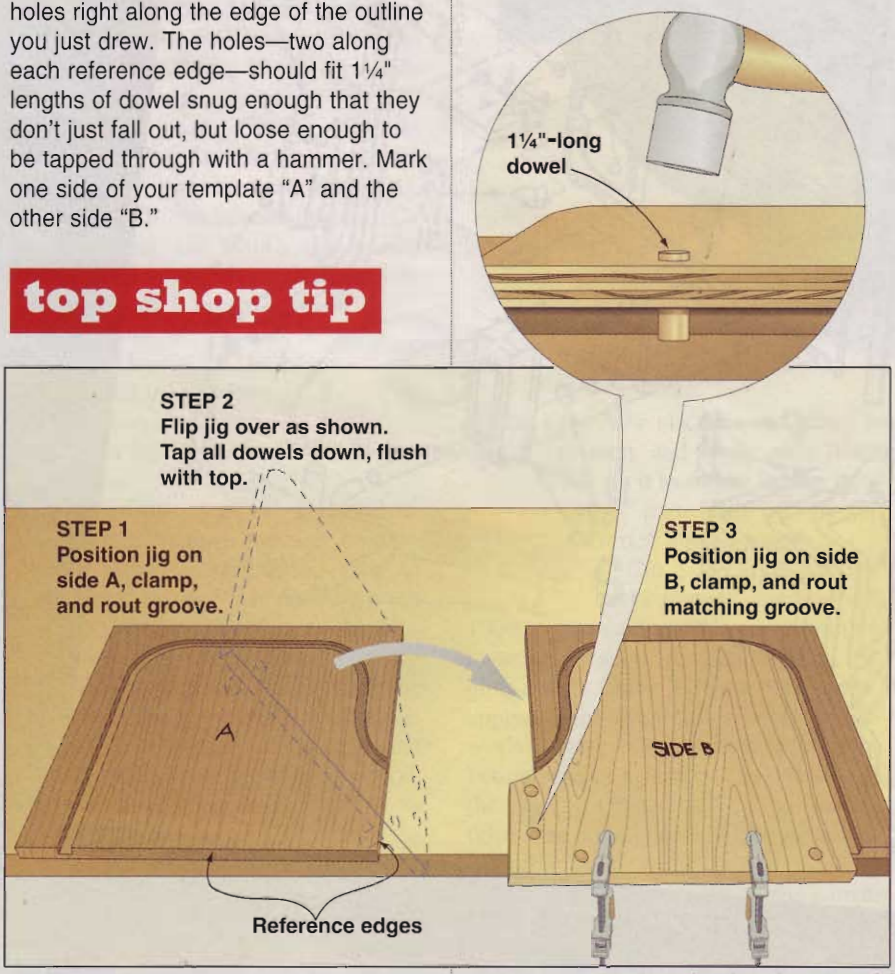
Make a template for the slots using ¾" medium-density fiberboard (MDF), leaving enough extra material on two edges to register the template, as shown *below*. With the template in position on your workpiece, trace the reference edges of the workpiece onto the bottom of the template.

Now flip the template over and drill holes right along the edge of the outline you just drew. The holes—two along each reference edge—should fit 1¼" lengths of dowel snug enough that they don't just fall out, but loose enough to be tapped through with a hammer. Mark one side of your template "A" and the other side "B."

To use the jig, install a pattern bit in your handheld router and set the cutting depth. (Don't forget to add the thickness of the template.) Tap the dowels so that they're flush with the "A" side of the template, clamp the template to the workpiece ("A" side up) so that the dowels register against the workpiece, and rout the groove. Now, flip the template to the "B" side, tap the dowels flush again, register and clamp the jig to the mating workpiece, and rout.

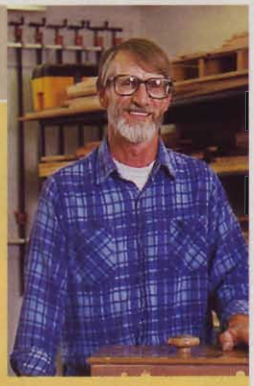
—Gary Burman, Monroe, Iowa

top shop tip



Continued on page 36

our winner



Long before Gary Burman broke ground for his house, he built a 17×30' heated workshop on his property near Monroe, Iowa. (You gotta love a guy who has his priorities straight.) Our Top Shop Tip winner and his wife Barb have been using the shop for the last six years while they construct the house. They plan to build most of the furniture as well. As for the home's estimated date of completion? "It'll be done when it gets done," he grins.

Gary Burman's shop just got a little nicer, thanks to the MLCS Router Table (model #9090) he'll receive for sending in this issue's Top Shop Tip. Great job, Gary!

You can win a free tool, too!

Tell us how you've solved a workshop dilemma, and we'll send you $75 if we print your solution. And, if we name your tip as the Top Shop Tip, you'll also win a tool worth at least $250.

Send your best tips, along with photos or illustrations and your daytime telephone number, to: **Shop Tips, *WOOD*® Magazine, 1716 Locust St., GA-310, Des Moines, IA 50309-3023**. You can also e-mail tips to **shoptips@woodmagazine.com**, or post them on our Top Shop Tip forum at **www.woodonline.com**.

Because we try to publish only original tips, please send your tips only to *WOOD* magazine. Sorry, but we can't return your materials.

Take your woodworking to the next level with classes and demos from Woodcraft featuring

WOODCRAFT®
EDUCATIONAL SERIES
Better Homes and Gardens WOOD

WOODCRAFT
Helping You Make Wood Work

For your local woodcraft store, visit www.woodcraft.com, or for a free catalog, call 800 542-9115

Dept.02WI12BE

Circle No. 924

Twin templates tackle tear-out

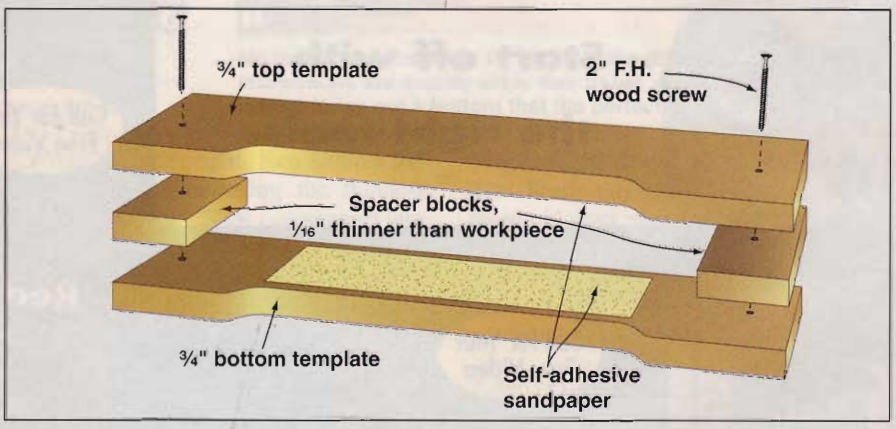
On previous projects, I've had trouble with tear-out and splitting when pattern-routing irregular-shaped pieces. (The problem occurs when the grain direction changes due to the shape of the piece.) To solve this problem, I created a two-sided pattern-routing jig, as shown *below*.

To make your own, cut one template from ¾" medium-density fiberboard (MDF), allowing extra length on each end for the spacer blocks. Now, using this template and a pattern bit in your router, make a second, identical template. Apply the self-adhesive sandpaper, and assemble both templates and the spacer blocks as shown.

To use the jig, loosen the screws slightly, insert your part blank into the jig, and retighten the screws. Bandsaw the blank to rough shape while it's in the jig, then rout the workpiece to final size with a pattern bit in your table-mounted router.

The top and bottom templates are identical, so when you come to a curve where the grain changes direction, simply flip the jig over and continue routing. The change in cutting direction eliminates the tear-out.

—Donald Cooper, Carnegie, Okla.



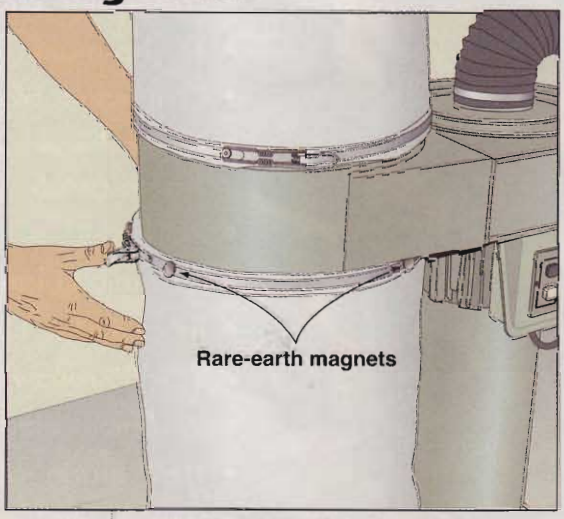
Magnets offer dust-bag assist

Next to changing jointer knives, my least favorite shop chore is emptying my dust collector's bag. Getting the bottom bag on with a good seal drives me crazy. At least it used to.

These days, I use a trio of rare-earth magnets to help with the job. These super-strong magnets hold the weight of the empty bag right through the cinching strap in the dust bag.

After positioning the back of the bag on the rim, I hold it in place with one magnet, then slip the rest of the bag opening over the rim. I space the remaining two magnets evenly around the rim, freeing both hands to cinch up the bag's strap.

—Rick Roll, Depew, N.Y.



Note: *You can get six rare-earth magnets for $14 from Woodcraft (www.woodcraft.com, or 800/225-1153). Ask for part no. 128474.*

Continued on page 39

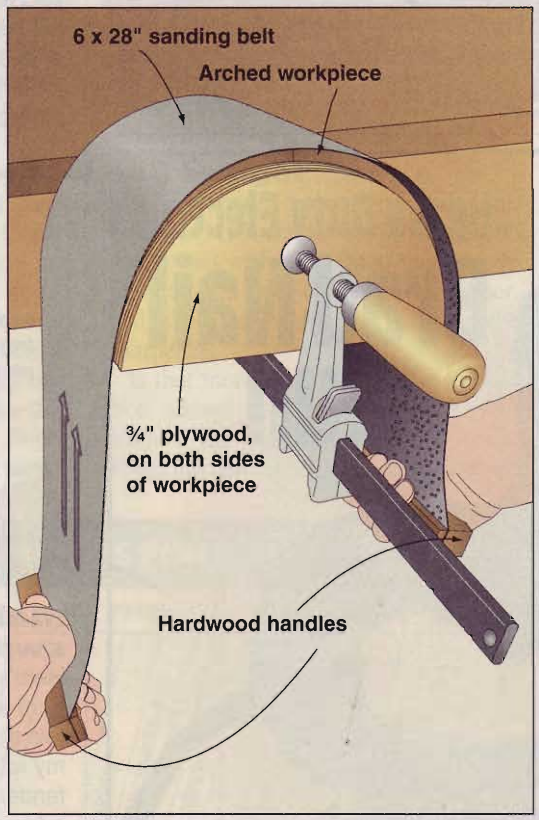
Sanding needn't be your arch enemy

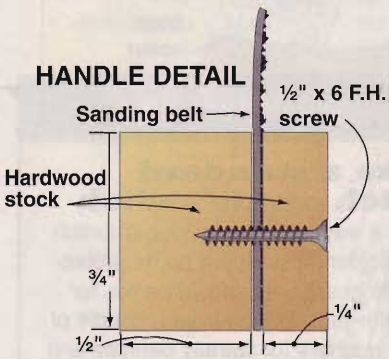
Although I've been working with wood for many years, I've had few occasions to sand curves as wide as the top of the Arched-Top Clock in *WOOD®* magazine, issue 138. The Extra-Long Drum Sander on page 42 of the same issue works well for sanding the inside curve of the arch, but tends to scallop the outside curve.

To solve this, I cut a couple of half-moon scraps of plywood slightly smaller than the arch diameter. I sandwiched the arched clock top between these plywood pieces and clamped them to the front edge of my workbench, as shown *below*.

Next, I cut an old 6×48", 120-grit sanding belt into a 28"-long strip and attached a pair of handles, as shown in the Handle Detail. Finally, I draped the sanding belt over the arch and sanded it, shoeshine-style. This technique left me with a silky-smooth surface.

—Kent Chase, Gregory, Mich.



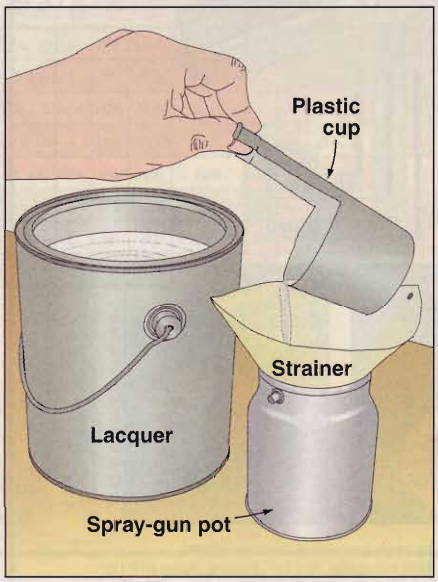


Drink cup takes a dip for a fine finish

I finish many of my projects with spray lacquer, and buy the stuff by the gallon. It's no fun trying to fill a spray-gun pot from a full can, so I made a dipper from an old convenience-store drink cup.

I cut the cup so it resembles a ladle, as shown at *right*. If you cut it so it leaves you about 1⁄3–½ cup of capacity, that's plenty. Now, I use the ladle to scoop lacquer out of the can and pour it through a strainer into my spray-gun pot. And, if I want to thin the lacquer, say 50/50, I add an equal amount of thinner, again using the ladle, this time as a measuring cup.

—Jerry Vance, Lubbock, Texas



Continued on page 40

FASTER
30 Second Set Time
•
No Clamping or Bracing
•
Improves Productivity
HiPURFORMER™
ADVANCED BONDING SYSTEM

1-800-347-4583
www.titebond.com
Titebond®
Glues & Adhesives
Circle No. 24

Quality Pen Kits
and Other Turning Kits

• Designers & Manufacturers • Wholesale & Retail

THE BereaHardWoods CO. Inc.

Manufacturer of quality writing instruments, components and kits.

CALL FOR FREE CATALOG
6367 Eastland Rd. • Brookpark, Ohio 44142 U.S.A.
Ph: 440-234-7949 • Fax: 440-234-7958 • bereahard@aol.com

Circle No. 947

ARROW ELECTRO-MATIC

Heavy Duty Electric
Brad Nail Gun

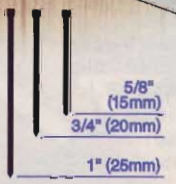
ET100™
Nail Master™

•Ergonomic Design
•Durable
•Powerful

10 Amps

Removable Non-Marring Bumper

Shoots 3 Different Length Brads



ARROW Wherever fine tools are sold.

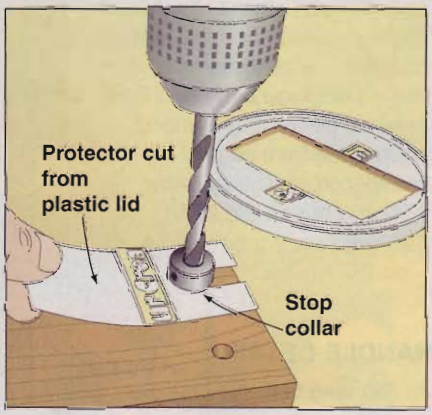
Arrow Fastener Co., Inc., 271 Mayhill Street, Saddle Brook, New Jersey 07663
Canada: Jardel Distributors, Inc., 6505 Metropolitan Blvd. East, Montreal, Quebec H1P 1X9
United Kingdom: Arrow Fastener (U.K.) Ltd., 14 Barclay Road, Croydon, Surrey CR0 1JN
www.arrowfastener.com ©2000 ARROW FASTENER COMPANY, INC. Rev.700

shop tips

Keep a lid on drill stop-collar damage

To prevent my drill bit's stop collar from marring my workpiece, I insert a slotted plastic protector between the collar and workpiece, as shown *below*. You can cut the protector from pretty much any kind of flexible plastic (milk jugs, butter tub lids, etc.), and can make different protectors for different size bits. Just remember to figure the thickness of the plastic into your stop-collar depth.

—Benjamin Farbaniec, Elizabeth, N.J.



Make a standard switch a safe switch

Here's a way to protect a power switch from accidental startup. I made protective side guards, as shown *below*, for my router-table switch from a couple of fender washers for literally pennies and a few minutes' time. To further protect curious kids, drill and chamfer a pair of holes in the washers where shown in the drawing, and insert a padlock through the holes.

—Don Cooley, Kansas City, Mo.

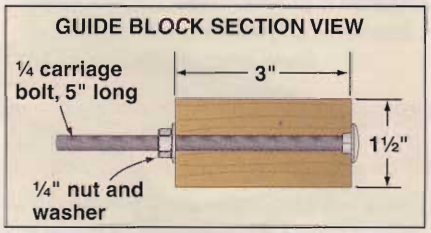
Oh, deer! Squaring uneven pen blanks

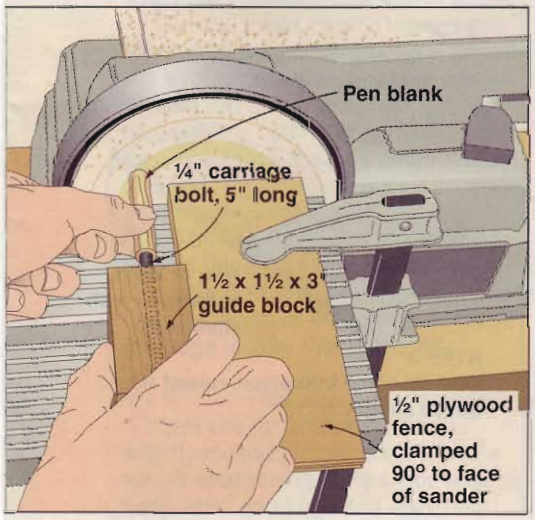
Recently, I was making some unusual pens out of deer antlers, but because the antlers are irregularly shaped, I found it almost impossible to get a square face on the end after gluing in the brass tubes. However, I came up with a simple jig that uses a disc sander to square the face of virtually any irregular-shaped object.

First, I drilled a hole through the end of a scrap block of 1½×1½×3" hardwood, making certain that the hole was perfectly parallel to the sides of the block. In this hole I inserted a ¼×5" carriage bolt, and secured it with a nut and washer. This is my guide block.

When I need to true up the end of a pen blank, I clamp a scrapwood fence to my disc sander's table so that I have a straightedge perpendicular to the disc, as shown *below*. With the pen blank slipped over the end of the carriage bolt, I simply hold the guide block against the fence, turn on the sander, and slowly slide the guide block and blank into the disc. This method works on both ends of the blank, squaring them independently of each other.

—Jim Morgan, Dickson, Tenn.

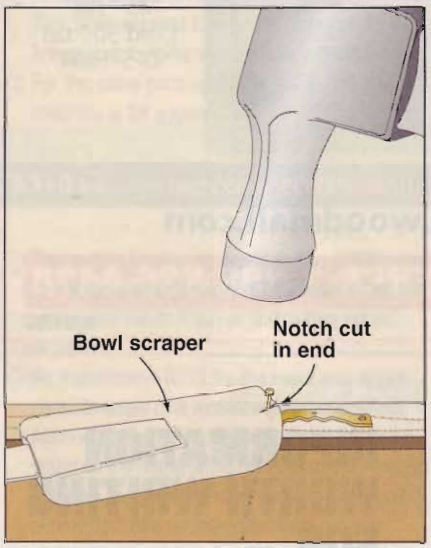




Driving or pulling, scraper saves the day

I can't tell you how many times I've thumped my thumb and index finger when driving small nails and brads. No more. A discarded kitchen bowl scraper with a small notch cut in the blade, as shown *below*, now keeps my digits far from the hammer head. I use the same scraper between the hammer and workpiece when I need to pull a nail. The soft, rubber-like blade protects the surface from hammer damage.

—R.B. Himes, Vienna, Ohio



Tool "pantry" keeps clutter out of shop

When I designed my two-car-garage workshop, I built in a separate 6×12' storage room for hardware, accessory items, and lesser-used tools. Just as in Grandma's pantry, an array of shelving helps pack a lot of stuff in a small space. Keeping the door closed minimizes dust buildup, and also eliminates the daily clutter of all of those "essential" tools I bought and only used once.

—Bob Mitchell, Ferndale, Wash.

Taking your idea one step further, Bob, you could put a lock on that door and provide added security for your more valuable tools. That's especially important when your garage shop shares space with bikes, cars, and nosy neighbors.

—WOOD® magazine

Continued on page 42

STRONGER
Superior Strength
•
Eliminates Nails & Staples
•
Permanent Bond
HiPUR FORMER™
ADVANCED BONDING SYSTEM

1-800-347-4583
www.titebond.com
Titebond®
Glues & Adhesives
Circle No. 24

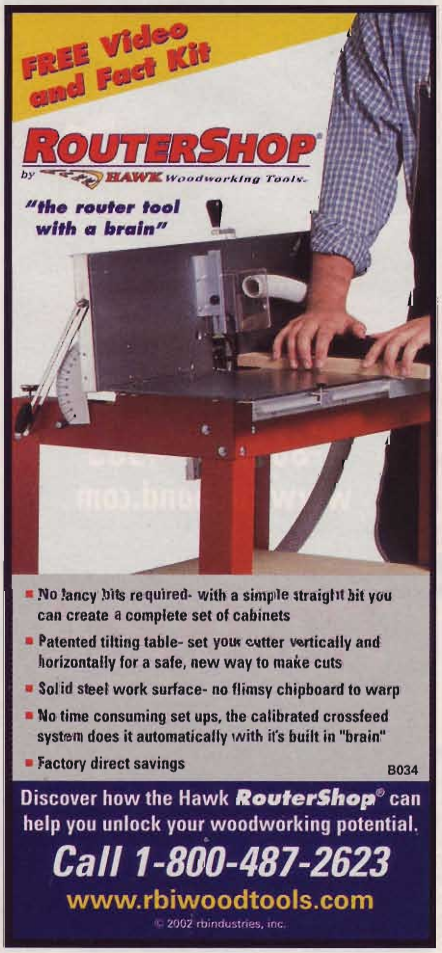
Better Homes and Gardens
WOOD PLANS
Only $13.95 Each!
from the editors of WOOD® magazine

FROSTY
48" tall
OFS-1033

MRS. SNOW AND SNOWFLAKE
Mrs. Snow
45" tall,
Child 30" tall
OFS-1034

For a complete selection of woodworking plans, visit the WOOD STORE® at:
http://woodstore.woodmall.com

TO ORDER, CALL TOLL FREE: 1-888-636-4478
WD1202



- No fancy bits required- with a simple straight bit you can create a complete set of cabinets
- Patented tilting table- set your cutter vertically and horizontally for a safe, new way to make cuts
- Solid steel work surface- no flimsy chipboard to warp
- No time consuming set ups, the calibrated crossfeed system does it automatically with it's built in "brain"
- Factory direct savings

B034

Discover how the Hawk RouterShop® can help you unlock your woodworking potential.
Call 1-800-487-2623
www.rbiwoodtools.com
© 2002 rbindustries, inc.

Circle No. 1676

INFORMATION WORTH WRITING FOR

A Moment of Your Time for a Wealth of Information!

Top-quality catalogs and brochures from the nation's leading woodworking companies; the easy way for those who enjoy *woodworking* to explore products and services that will enhance the entire experience. Before you start your next project, turn to the back of this magazine, complete the order card and receive a wealth of...

INFORMATION WORTH WRITING FOR

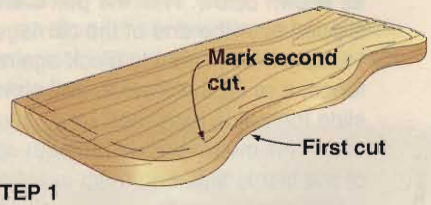
See Page 112

Lip service: raising the front of a curved shelf

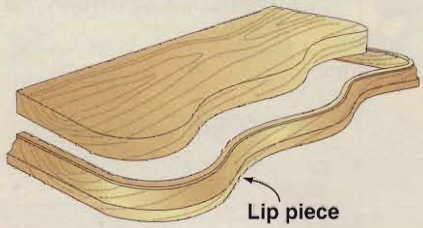
When I build a shelf, I like to raise a lip on the front edge to keep items from sliding off. That's easy on a straight shelf, but more difficult on a curved piece. I came up with a method, shown *below*, that works well for me.

First, I cut the shelf to shape, but oversized to also include the width of the lip. Next, I rout a decorative profile on the edge of what will become the lip piece, then bandsaw this piece from the front of the shelf. Now, without sanding the second cut, I reglue the lip piece to the shelf, raised slightly to create the lip.

—Joe Barbish, Euclid, Ohio



STEP 1
Cut curved shelf edge (first cut).



STEP 2
Rout decorative edge, then make second cut.

STEP 3
Glue lip piece into place, raised ⅛" above shelf.

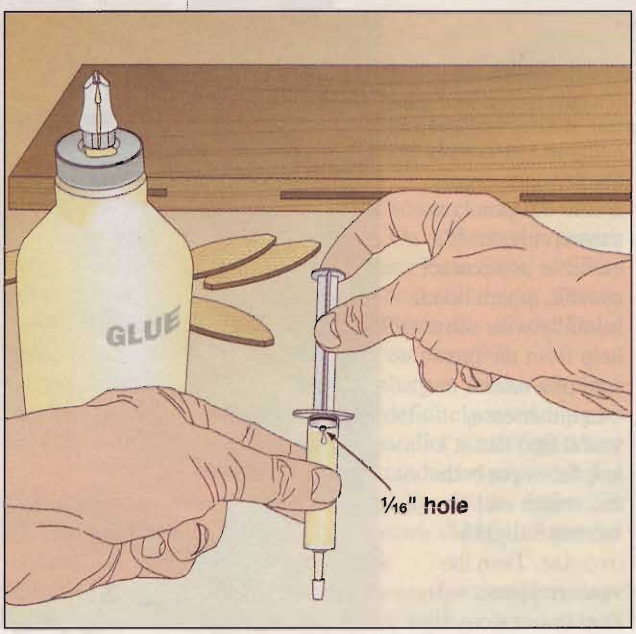
Eliminate the air bubble in glue syringes

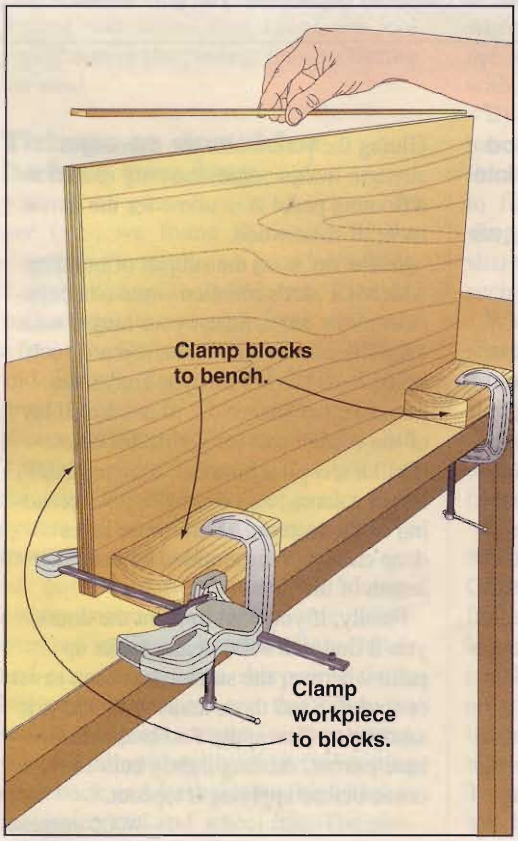
An air bubble inside a glue syringe can make glue seep out even after you've stopped pushing the plunger. You can avoid the bubble by filling it through the tip, but that requires more patience than I have. To eliminate both problems I modified my glue syringes.

Before filling a syringe with glue, I pull the plunger as far back as I can without removing it, then mark a spot on the outside of the tube just above the piston. Next, I remove the plunger, drill a 1/16" hole at that spot, and file off the burr inside the tube.

Now, I fill the syringe with glue from the top all the way up to the drilled hole, and reinsert the plunger. The air bleeds out, and any excess glue comes out the hole, where it can be easily wiped away.

—Marv Riedel, Hartford, Wis.





Living on the edge without a vise

I don't have a nice woodworking vise, so when gluing some edgebanding to a plywood shelf recently, I had to improvise a way to hold the shelf on edge. I C-clamped two blocks of 2×4 scrap to my bench, as shown *left*, and then clamped the shelf to these blocks. I attached the banding, and trimmed it flush with my laminate trimmer without moving the shelf.

—Joshua Friend, Monroe, Conn.

SHOP TIP

Get a new Shop Tip every weekday when you log on to our Web site at www.woodonline.com. Just click on "Shop Tip of the Day" to work smarter, not harder.

BETTER
Bonds Most Anything
•
20 Minute Cordless Use
•
100% Waterproof
HiPURFORMER™
ADVANCED BONDING SYSTEM

1-800-347-4583
www.titebond.com
Titebond®
Glues & Adhesives
Circle No. 24

ask wood

Answers to your questions from letters, e-mails, and WOOD ONLINE®

Shopmade veneer is a solid choice

Q: I have resawn (and planed, and scraped) maple lumber into 1/16" veneer, and plan to apply it to 1/4" plywood for panel doors. Will the wood remain stable at that thickness, and what's the best adhesive to use?

—Marty Schmidt, St. Louis

A: That's an admirable thickness for shopmade veneer, Marty, and it should work just fine. Here are some suggestions for added stability: Apply the veneer so that its grain runs at a right angle to the grain on the surface of the plywood, and use veneer on both faces of the plywood.

You have a couple of choices for the adhesive. Yellow woodworker's glue creates the most durable bond, but contact cement also will do the job. Yellow glue requires clamping, and you must apply the pressure evenly across the panel, as shown at *right*. It's easier to use contact cement, which bonds instantly with some help from the pressure of a roller.

In either case, you'll find that it's helpful to cut both the veneer and its substrate slightly oversize. Trim the veneered panel to its final dimensions after the adhesive dries.

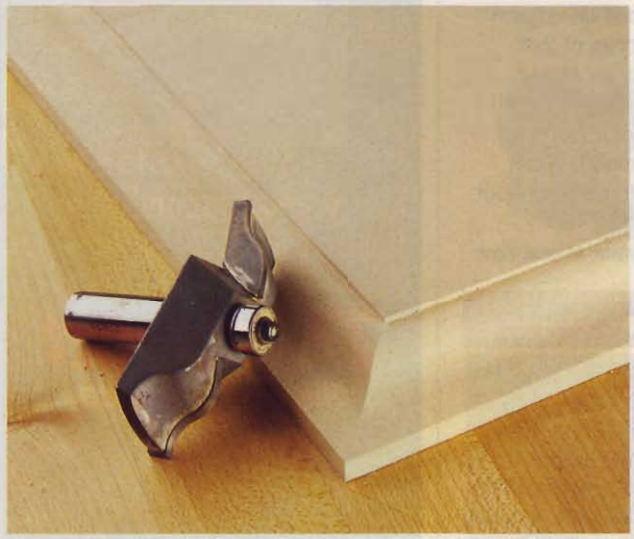
—WOOD® magazine

Use pieces of 3/4" medium-density fiberboard, shielded with waxed paper, as clamping cauls when you glue veneer.

Raised-panel cabinet doors from MDF?

Q: I plan to make frame-and-raised-panel cabinet doors, some as large as 24×48", with medium-density fiberboard. Is this a good idea, and should I glue the panels into the frames for extra strength?

—Frank Tumianiec, Hartford, Wis.



A sharp router bit produces crisp edges in medium-density fiberboard, including the lightweight version shown here.

A: Our master craftsman, Chuck Hedlund, recently made a set of cabinet doors for his home with MDF, and got great results. He used the lightweight version. We recommend that you do the same, considering the size of those doors. A 3/4×24×48" panel made of standard MDF weighs about 24 pounds, while the lightweight version would weigh about five pounds less.

Gluing the panels into the frames for strength makes sense; the only reason for a floating panel is to allow for the movement of solid wood.

While we're on the subject of building with MDF, let's mention some other considerations. First, fasten your hinges with deep-thread, straight-shank screws, such as the deck screws that you find at any home center. Make sure to use a drill bit of the correct size for your pilot holes. (Drill a test pilot hole in a scrap of MDF, install a screw, and check for any spreading of the material.) Drill those holes deep enough to accommodate the entire length of the screw.

Finally, if you plan to paint the doors, you'll find that MDF really soaks up paint wherever the surface has been sawn or routed. Sand those areas with 320-grit sandpaper, then apply two coats of oil-base primer, sanding lightly between coats, before applying a topcoat.

—WOOD magazine

Continued on page 46

Circle No. 1870

Circle No. 1876

The golden rule of project design

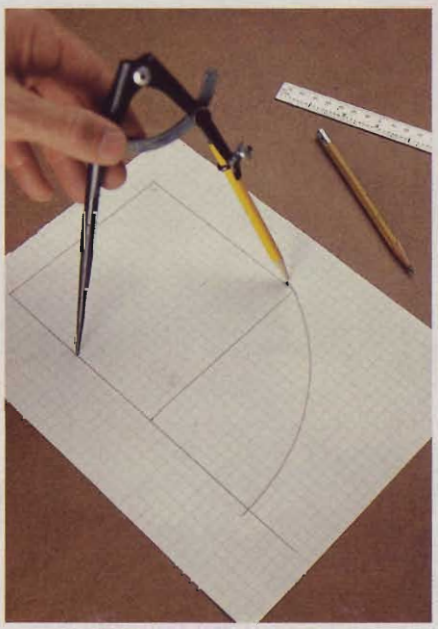
Q: I'm designing a piece of furniture, and trying to remember what I've read about the "golden mean." Can you refresh my memory?

—Bart Haines, Kansas City, Kan.

A: Bart, if you design with the numbers "1" and "1.6" in mind, you'll join a tradition that stretches back to the ancient Greeks, or even further. For generations, designers have understood that a rectangle whose length is 1.618 times its width is naturally pleasing to the eye. The ratio shows up everywhere from the ancient Greek Parthenon to the credit card in your wallet. You'll also see it designated as the "golden section" or the "divine proportion."

To lay out such a rectangle, start by drawing a square with sides equal to the shorter dimension you want. Extend the bottom side in one direction. Place the point of a compass at the midpoint of the bottom side, and adjust it so that the pencil touches a corner on the opposite side, as shown in the photo. Swing an arc to intersect the extended line. Draw a vertical line from that point, extend the top side of the square, and you have a rectangle of divine proportions.

—WOOD® magazine



Graph paper and a compass make it easy to design furniture and other projects with classic dimensions.

The best finish for a drinking vessel

Q: I teach high school industrial arts, and one of my students turned a beautiful goblet. Now he wants to apply a finish that will look great, and also stand up well to liquids. What's the best choice?

—Jim Smith, Lake Wales, Fla.

A: Woodturning expert Alan Lacer recommends a wiping varnish, Jim. Select a good-quality polyurethane, then thin it 50/50 with mineral spirits for easier, smoother application, and to allow more time for bubbles to pop. Wipe the varnish on the goblet with a clean cloth, and rub it lightly between coats with 0000 steel wool. Apply three or four coats, and let the final coat cure for a month before use. Once it has cured, it won't interact with drinks or change their flavor. Varnish is likely to chip if it's used on plates or other items that come in contact with utensils, but works wonderfully for drinking vessels. "I've done this with goblets that I turned for churches, and they're still in good shape after 20 years," Alan says.

—WOOD® magazine

You can put a nice-looking sheen on a turned wood goblet and protect it from liquids by wiping on several coats of thinned polyurethane varnish.

When you're checking a jointer for squareness, place a good square on the outfeed table, right behind the knives.

"Tolerance" is a relative term

Q: After setting up my new Delta jointer, I checked the squareness of the fence to the table. It was perfect at most points, but some places showed a gap of .01" at the top of the fence. Should I be concerned?

—Jack Petropoulos, Hopkinton, Mass.

A: Jack, we carefully check such specifications when we test tools, but our main concern is to single out products that rank above or well below average. You're wise to check your machinery for accuracy, but the kind of gap you found shouldn't affect your results in any significant way.

Delta Machinery standards call for the fence to be flat within .015", and the same for both the infeed and outfeed table. If those components are acceptably flat, you should be able to set the table and fence square to one another. If they're not within that tolerance, Delta will replace the machine. You can get technical advice from Delta by calling 800/223-7278.

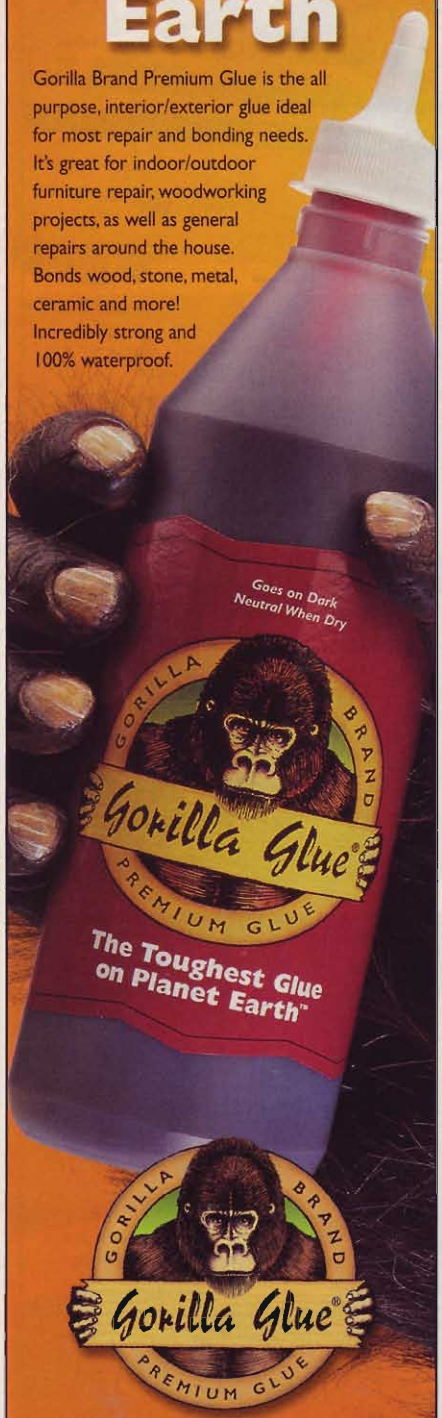
We asked machinery expert Mark Duginske for his opinion, and he suggests that you check the squareness of the fence right behind the knives and set that as close to perfect as possible. That should provide good results even if the entire fence isn't dead-on.

—WOOD magazine

Continued on page48

The Toughest Glue On Planet Earth

Gorilla Brand Premium Glue is the all purpose, interior/exterior glue ideal for most repair and bonding needs. It's great for indoor/outdoor furniture repair, woodworking projects, as well as general repairs around the house. Bonds wood, stone, metal, ceramic and more! Incredibly strong and 100% waterproof.



for retailers near you:
www.gorillaglue.com
1-800-966-3458

Circle No. 50

The Best Place to Buy Over 1100 DEWALT Tools Online

*at the lowest prices guaranteed**

#DW616PK

1-3/4 HP Fixed Base / Plunge Router Combo Kit

- 1-3/4 HP (max. motor HP), for smooth routing in toughest hardwoods
- Quick release motor latches, to change from fixed to plunge base
- Micro-fine depth adjustment ring in 1/64" increments
- Adjustable, tool-free steel motor cam lock

Shop at www.amazon.com/dewalt

**We will match our competitors price plus beat it by 10% of the difference. Find out more at www.amazon.com/price-match.*

Call for your FREE Tool Crib catalog

1-800-635-5140

TOOLS & HARDWARE

amazon.com

Gloss varnish goes great under satin

Q: I've read the recommendation to use gloss varnish for the first coats of finish, followed by satin for the final coat. What's the theory behind this sequence?

—Robert Kreider, Oakland, Calif.

A: Bob, satin varnish contains tiny flakes of a flatting agent—silica, in many cases—and these bits of matter possess a couple of characteristics that you don't want in your base coats: They tend to make satin varnish slightly softer than a gloss varnish, and they create a somewhat cloudy appearance as you add coats. When you start with gloss, you create a solid base for the satin topcoat, and you retain clarity. Finishing expert Jim Kull adds these suggestions on achieving a great satin finish:

- Make sure to stir satin varnish thoroughly and repeatedly so that the flatting agent disperses evenly throughout the varnish. Otherwise, you're likely to get streaky results.
- To avoid buying two kinds of varnish, you can stay with gloss for the topcoat, and then use rubbing compounds to alter it to the exact satin sheen you want. You can find suitable compounds at an auto supply store, available in a range of grits. However, it takes a fair amount of time and effort to rub a gloss varnish to a uniform satin sheen.

—WOOD® magazine

Follow the alphabet rule when applying coats of varnish: "G" for gloss comes before "S" for satin.

Follow the rules for measuring

Q: I've always used a tape measure for my no-frills woodworking. As I start building more "refined" projects, what should I use to get more accurate measurements? Folding rulers? Straight ones?

—John Morris, via WOOD ONLINE®

A: John, we use thin, etched, stainless steel rules in 6", 12", and 18" lengths to make small measurements in our shop, because we believe they offer the greatest accuracy. The thin profile places the scale close to the workpiece when the rule is lying flat (but hold the rule on edge for maximum accuracy), the etched lines are more precise than painted ones, and stainless steel rules remain easy to read. Folding rulers suit carpentry better than woodworking.

We found very slight differences in the markings on these tape measures. Switching between them during a project could affect the accuracy of your cuts.

However, we also regularly use a tape measure to measure long boards and sheet goods. For the best results, we suggest that you buy a brand-name tape, and get in the habit of "burning an inch" when you use a tape—that is, measure from the 1" mark, rather than relying on the hook, which is easily bent. Finally, use one tape all the way through a project, so that any slight variations between tapes don't come back to haunt you.

—WOOD magazine

Got a question?

If you're looking for an answer to a woodworking question, write to **Ask WOOD, 1716 Locust St., GA-310, Des Moines, IA 50309-3023**, or send us an e-mail at **askwood@mdp.com**. For immediate feedback from your fellow woodworkers, post your question on one of our woodworking forums at **www.woodonline.com**.

cherry

an american classic

When we rank our favorite woods, many woodworkers put cherry (*Prunus serotina*) at or near the top. This beautiful wood features a vibrant color, fine grain, and high luster that suit it superbly to furnituremaking and more.

Shakers, for instance, used cherry to build understated tables, chairs, and other furniture. Colonial cabinetmakers dubbed it "New England mahogany," and substituted cherry for that rare wood. Cherry adorned the interiors of railroad Pullman cars and fine carriages. Today, cherry ranks second behind oak in consumption among American furniture manufacturers, and the wood is a top choice for kitchen cabinetry.

Cherry's roots

Cherry grows throughout the eastern half of the United States as the map, *above*, shows. The most desirable trees, though, grow in the Appalachian and Allegheny mountains of Pennsylvania and New York. These trees can attain a 100' height and a 4' diameter. More frequently, the trees reach from 60' to 80' tall with trunk diameters from 2' to 3'.

Be picky when you select cherry stock

Despite increasing demand, you'll find cherry lumber available throughout the country. But be prepared to pay a premium for it. See "cherry at a glance" on the *following page* for more information.

Cherry's grain shows beautifully however the log is milled, so it's usually flat-sawn to garner the highest yield. Boards 4" to 9" wide are common, though you may find them as wide as 24". These prized boards can command double the price of narrower stock.

Even in high-grade lumber, you'll encounter boards with some sapwood, shown in the photo, *right*. So examine both faces of every board. Those showing all heartwood on one face can be partially sapwood on the other face.

Gum pockets, shown *below right*, also are common in cherry. These black streaks aren't considered defects if they appear in small quantities. Commercial cherry exhibits relatively few knots, and the small ones that may exist usually remain tightly held.

Cherry varies in tone from light brown to almost pink, which can complicate color matching. Place boards side by side as you shop to help match color. Over the years, all cherry darkens to a more uniform reddish brown.

Your reward for a diligent search may be a board with attractive ray flecks, especially if you find quartersawn or riftsawn stock. On rare occasion, you'll even encounter curly figure, as seen in the photo *below, bottom*.

Many times, the best logs are reserved for making veneer—which is often figured—and plywood. Veneers sell for $2 per square foot and up, while a 4×8 sheet of ¾" cherry plywood can carry a price tag of nearly $100.

Cherry sapwood on the left side of this board appears white and relatively dull in comparison to the heartwood at right.

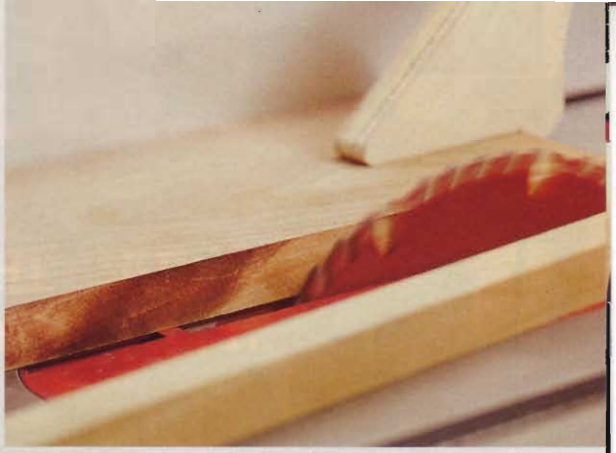
Gum deposits form the black lines in cherry. These areas aren't considered defects, and some woodworkers like the way the pockets highlight grain patterns.

Cherry grain is beautiful however the boards are sawn. Some patterns, such as this iridescent curly figure, are rare, and usually end up in veneer.

Tips for sanding and machining cherry

Black cherry ranks as moderately easy to work with. Due to its gummy nature, though, the wood does pose a few challenges when machining. Rip-cutting and routing bring out one of cherry's weaknesses: It burns easily, as shown at *right*. To ensure the best success when machining and sanding this wood, use the following techniques:

- To eliminate burn, use sharp bits and blades, and maintain a steady feed rate. Slowing down a variable-speed router helps, as well.
- When ripping, cut the stock just a hair wide, then clean up the fresh-sawn edge at the jointer.
- In other areas, remove burn marks using 100- or 120-grit sandpaper, or a hand scraper.
- Dampen stubborn burns with mineral spirits to soften the gum, then remove them with a scraper.
- While machining can bring out cherry's problems, sanding causes its beauty to blossom. The wood takes on a beautiful luster, and doesn't require grain filler.
- For a smooth surface, sand face and edge grain through 180 grit.
- Maintain an even color on end grain by sanding to 220 or 240 grit, which limits finish absorption.
- Be diligent about sanding or scraping away any glue squeeze-out. You might not notice errant glue on bare stock, but cherry's color makes glue extremely noticeable under a finish.



Avoiding the blackened edges left on these boards is tough when machining cherry. It helps to keep your feed rate constant—a brief pause in feeding the stock is all it takes to cause burns.

Favorite finishes

Cherry achieves its greatest beauty with just a clear finish—no stain is needed. The wood develops a darker tone with exposure to light.

For a gorgeous satin finish, apply three or four coats of oil- or water-based varnish, as shown in the photo, *right, top*. Apply paste wax, then watch the color blossom as the months and years pass.

You can give new cherry an aged look using stain, but remember that, even under stain, the wood darkens. Pigment particles in the stain will hide some of this, but aim for a color a little lighter than you ultimately want.

Unfinished cherry, left, looks similar to wood finished with water-based poly, center. An oil/poly blend, right, adds an amber tint and evens out grain colors.

A gel stain, left, imparts an even, consistent color to the wood. However, the heavier pigments can hide some grain. The liquid stain, right, shows the grain but appears blotchy.

Staining presents another challenge with cherry. Variations in the wood's pores cause it to absorb stain unevenly and take on a blotchy appearance, as shown in the photo *above*.

If you color the wood using liquid stain, apply a wood conditioner first to limit absorption. Be aware that the conditioner may make the stain appear lighter. To get an even tone in just one step, apply a gel stain, which doesn't soak in as deeply. Aniline dyes also work, but may require experimenting to get the desired color.

cherry look-alikes

In an effort to reduce costs, furniture-makers often substitute poplar, soft maple, or birch for cherry. Then, these companies add stain and toners in an attempt to replicate aged cherry's deep reddish brown hue. These colorants may impart a look that will fool the untrained eye, but they can't imitate the rich color of naturally aged cherry. The closest match we've achieved comes by applying a gel cherry stain over alder, as shown *below*.

Coated with Minwax gel cherry stain, alder takes on a color similar to stained cherry. While not an exact match, alder is about 40 percent cheaper than cherry.

Written by **David Stone**
Illustration: **Steve Schindler**
Photographs: **Marty Baldwin**

cherry at a glance

Price: We surveyed lumber dealers for their prices on 4/4, firsts-and-seconds (FAS), random-width-and-length boards. In many areas, the common going rate was $6 per board foot. West Coast prices ranged slightly higher. In the Northeast, where cherry grows in abundance, rough stock sells for as low as $4.50 per board foot. Stock surfaced on two sides commands $5. It pays to shop around before you buy. Why? Scattered among stores with the prices above, we found others charging up to $9 per board foot.

Pros: Cherry has a beautiful, lustrous natural color that gets darker and richer with age. It sands to a mirror finish, takes all clear finishes well, and is extremely durable. You'll find good lumber readily available.

Cons: When ripped or routed, cherry burns easily. Stains absorb unevenly, causing a blotchy appearance. Matching new wood to old is difficult. Cherry prices are high, and will increase as demand outstrips supply.

routed-inlay • serving tray

Does the look of inlays impress you but the thought of making them give you butterflies?
Don't be concerned because we're about to teach you a no-hassle method to make perfect-fitting inlays like the ones in this tray. Not interested in inlays? Go ahead and build the tray anyway—it still looks great without them.

For the items needed to build this project, see the Materials List and Cutting Diagram on *page 54*.

1 From ¼" oak plywood, cut two 14×22" blanks for forming the tray bottom (A). From scrap ¾" plywood, cut two pieces the same size. You'll use these as cauls when gluing the ¼" blanks together.

2 Identify the two best faces of your ¼" blanks that you want to face out. Then, glue their inside faces together; sandwich the lamination between the cauls, and clamp around the perimeter.

3 When the glue dries, joint one long edge of the laminated plywood blank, and rip the opposite edge to achieve a panel width of 13".

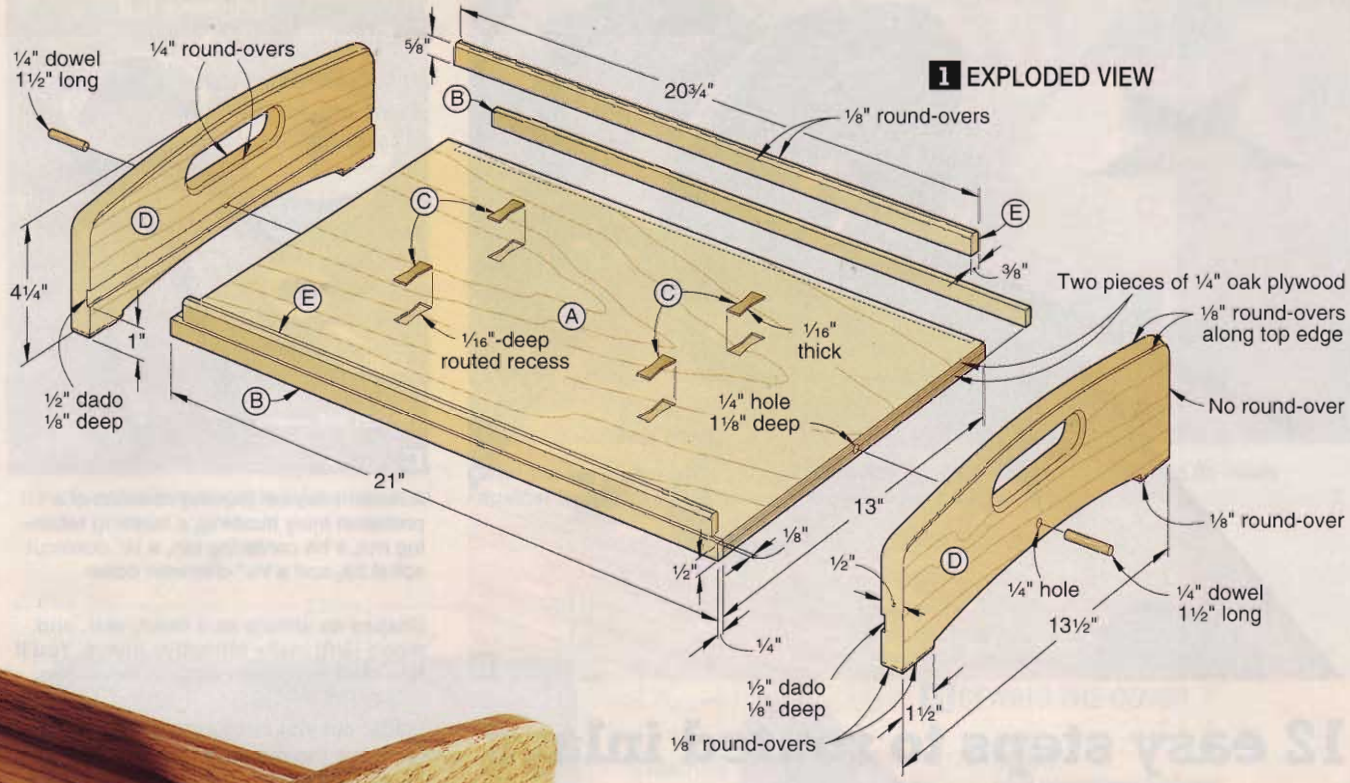
4 From ½"-thick oak (thickness the same as the laminated bottom blank), rip two ¼×22" strips for the edging (B). Glue and clamp the edging to the long edges of the blank. Later, crosscut both ends of the blank (A/B), leaving a finished length of 21". If you like the look of the butterfly inlays, cut and install them as described on *page 54*.

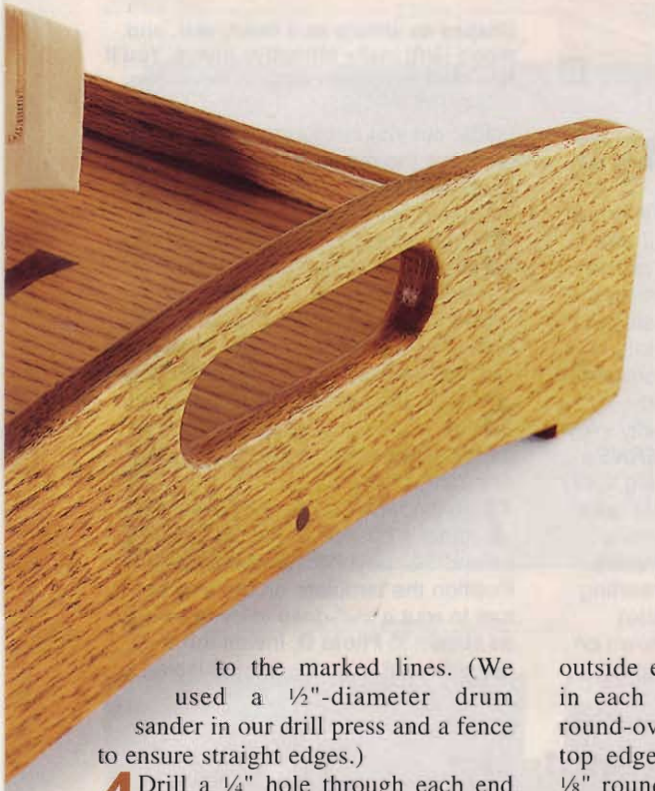
Make the end pieces and side rails

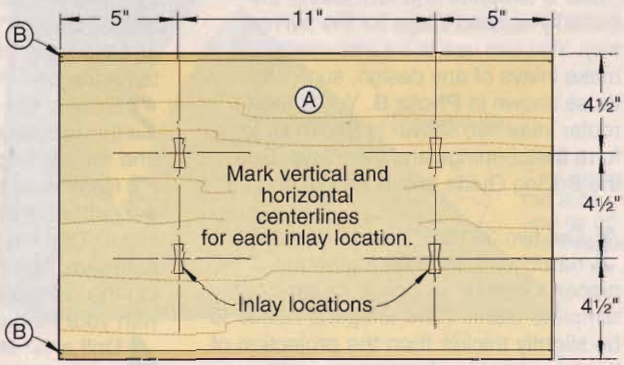
1 From ½"-thick oak, cut two 5×13½" blanks for the ends (D). Make two photocopies of the full-size tray end pattern in the *WOOD PATTERNS®* insert. Trim the patterns, and adhere them to the blanks with spray adhesive.

2 Using a 1" Forstner bit in your drill press and a backer board to prevent tear-out, drill holes at the ends of the handle opening in each end piece, where shown on the pattern.

3 Using a jigsaw fitted with a blade having 6 teeth per inch, cut the handle opening to shape in each end piece, as shown in **Photo A**, *opposite page*. Sand smooth







to the marked lines. (We used a ½"-diameter drum sander in our drill press and a fence to ensure straight edges.)

4 Drill a ¼" hole through each end piece, where shown on the pattern, to receive a ¼" dowel. Use a backer board to prevent tear-out.

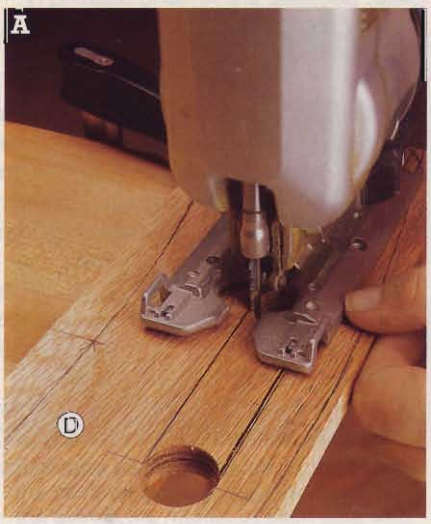
5 Using your tablesaw fitted with a dado blade, cut a dado the thickness of the bottom (A) ⅛" deep on the inside face of the ends (D), where shown on the pattern.

6 Jigsaw the top and bottom contours of the end pieces to shape by cutting just outside the pattern lines, then sand to the lines. Do not form the ½" radii at the ends of the top contour yet.

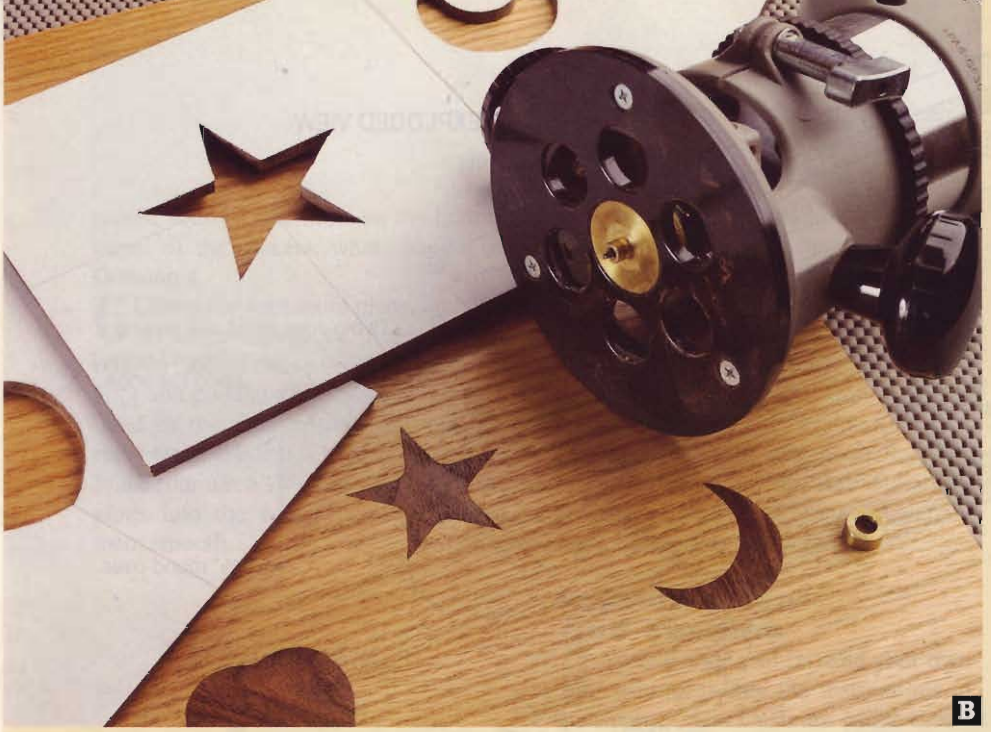
7 Using a table-mounted router, rout a ¼" round-over along the inside and outside edges of the handle opening in each end piece. Switch to a ⅛" round-over bit, and round over the top edges of each piece. Hand-sand ⅛" round-overs on the bottom edges of the feet, where shown. Now, cut and sand the ½" radii at the ends of the top contour, where shown on the pattern, and sand the edges of the radii to provide a smooth transition into the ⅛" round-overs.

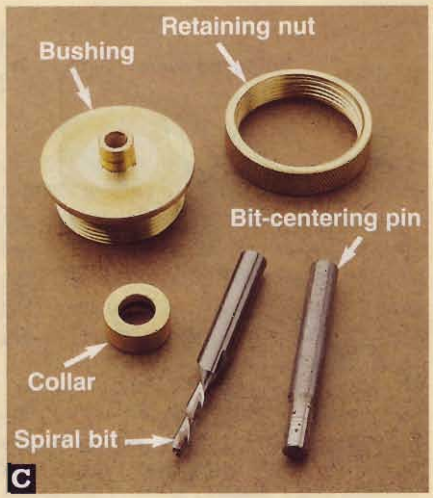
Assemble and finish

1 From ½"-thick oak planed to ⅜", cut a 3½×24" blank to form the side rails (E). Rout opposing ⅛" round-overs along both long edges of the blank, where shown on **Drawing 1**. Then, rip the ⅝"-wide side-rail pieces from the edges of the blank.



With an end piece (D) clamped to your workbench, cut just inside the pattern lines with a jigsaw to shape the handle opening.





A router inlay set (*above*) consists of a precision inlay bushing, a bushing retaining nut, a bit-centering pin, a ⅛" downcut spiral bit, and a 9⁄16"-diameter collar.

Shapes as simple as a heart, star, and moon (*left*) make attractive inlays. You'll find their templates easy to make, too.

12 easy steps to routed inlays

In the following steps you'll learn how to make a template and rout and fit the butterfly-shaped inlays for the serving tray. You can use this same method to make inlays of any design, such as those shown in **Photo B**. You'll need a router inlay set, shown in **Photo C**, to form the openings and the inlays. See the Buying Guide *below* for our source.

1 Cut two 3×13½" pieces from ⅛" hardboard, then face-glue the pieces together to form a router-inlay template blank. (The template needs to be slightly thicker than the projection of the inlay bushing from the router baseplate. Because the ¼"-long bushing is partially recessed in the baseplate, it projects a little less than ¼". We found that two pieces of ⅛" hardboard are thicker than ¼" hardboard and provide just the right clearance between the template and the end of the bushing.)

2 Draw a line across the 3" width of the template located 4½" from one end for aligning the inlay pattern.

3 Photocopy the full-size butterfly inlay pattern in the *WOOD PATTERNS®* insert. Trim the pattern; then, using spray adhesive, attach it to the template, aligning the pattern's horizontal centerline with your marked line on the template.

4 Drill a ¼" starter hole (for inserting your scrollsaw or jigsaw blade) through the template, where shown on the pattern. Then, using a fine-tooth blade, cut just inside the pattern lines to shape the opening. Finish shaping the opening by carefully filing or sanding to the lines.

5 On the top face of the tray bottom (A), mark vertical and horizontal centerlines for each inlay location, where dimensioned on **Drawing 1a**. Make the lines long enough so you can align the template's centerlines with them.

6 Install the inlay bushing and center the ⅛" downcut spiral bit in your router, as directed in the manufacturer's instructions.

7 Holding the template against your router's baseplate, adjust the bit to extend 1⁄16" beyond the template. Position the template on the tray bottom to rout a 1⁄16"-deep inlay opening, as shown in **Photo D**. Install the 9⁄16"-diameter collar on the inlay bushing.

2 Sand all parts to 220 grit. Glue and clamp the ends (D) to the bottom (A/B). Using the ¼" hole in each end piece as a guide, drill a ¼" hole 1⅛" deep into the bottom to receive a dowel, where shown. Cut two 2"-long pieces from a ¼"-diameter walnut dowel, and glue the dowels in the holes. With the glue dry, trim the dowels with a flush cutting saw, and sand smooth.

3 Crosscut the side rails (E) to fit between the ends (D). Apply glue to the bottom edge of the rails, and clamp them to the tray bottom, ⅛" in from the edging (B), where dimensioned on **Drawing 1**.

4 Apply a stain of your choice, followed by three coats of a clear finish. Sand between coats to 320 grit. (We used ZAR White Oak stain, and finished with Minwax aerosol fast-drying semigloss polyurethane.)

materials list

Part	FINISHED SIZE T	W	L	Matl.	Qty.
A* bottom	½"	13"	21"	LOP	1
B* edging	½"	¼"	21"	O	2
C* butterfly inlays	1⁄16"	⅝"	1½"	W	4
D* ends	½"	4¼"	13½"	O	2
E* side rails	⅜"	⅝"	20¾"	O	2

*Parts initially cut oversize. See the instructions.

Materials key: LOP–laminated oak plywood, O–oak, W–walnut.

Supplies: ⅛" hardboard, ¼"-diameter walnut dowel, spray adhesive.

Blades and bits: Dado blade set, 1" Forstner bit, ⅛" and ¼" round-over bits.

Buying Guide

Router inlay set. Solid brass router inlay set no. 09I16, $38.99. Fits any router that accepts universal guide bushings, including Black & Decker, DeWalt, and Porter-Cable. Woodcraft, call 800/225-1153, or go to www.woodcraft.com.

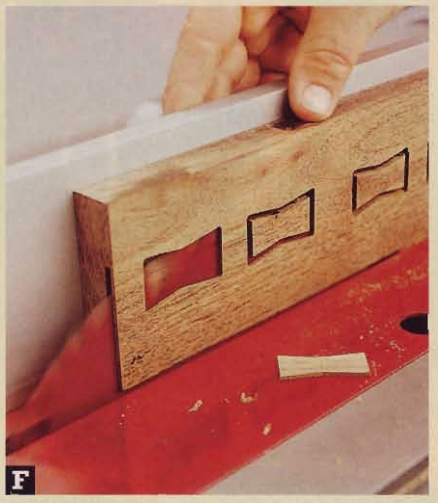
Written by **Owen Duvall** Project design: **Jeff Mertz**
Illustrations: **Mike Mittermeier; Lorna Johnson** Photographs: **Marty Baldwin**

D

Align the template's centerlines with the marked inlay centerlines, and clamp the template to the tray bottom.

E

After routing the first inlay, reposition the template along the walnut blank to form the remaining inlays.



F

With your saw fence and blade height adjusted as required, rip through the walnut blank to separate the inlays.

8 Plunge the router bit into the tray bottom through the center of the template opening; rout around the opening in a clockwise direction while keeping the collar flush against the template, and remove the waste from the inlay opening. Repeat this process to form the remaining openings.

Note: *The corners of the inlay openings will be round. You'll need to chisel them out to fit the inlays later.*

9 From ¾"-thick walnut, cut a 3×13" blank for forming the butterfly inlays (C). Adjust the router bit to extend ⅛" beyond the thickness of the template. Then, place the template against a face of the walnut blank, flush with an end, and clamp both to your workbench.

10 Remove the 9/16"-diameter collar from the bushing. Keeping the bushing continuously flush against the template opening, plunge the bit into the blank and rout around the opening. The area inside the routed groove forms the inlay piece. Repeat the process with the template repositioned, as shown in **Photo E**, to form the remaining inlays.

11 Place the walnut blank on your tablesaw with the nonrouted side against the fence. Position the fence to place slightly more than 1/16" of the routed side of the blank on the waste side of the blade. Adjust the blade height ⅛" above the top of the inlays. Then, rip the blank to separate the inlays, as shown in **Photo F**.

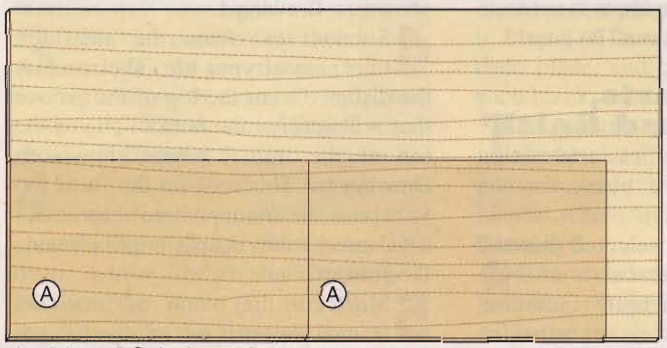
12 Chisel out the corners of the inlay openings so the inlays will fit into them. (As an alternative to chiseling, you can round the corners of the inlays by sanding them to fit the openings.) Then, glue the inlays in the openings, using a mallet and a wood scrap to fully seat them. With the glue dry, sand the inlays flush to the bottom.

4 SHOP TIPS

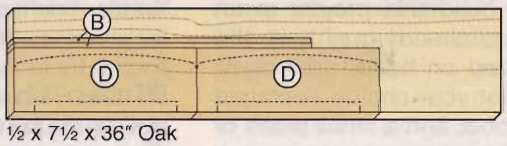
...for designing and routing inlays

- Draw your own inlay designs by hand or with computer graphics software, or use existing designs from such sources as computer clip art.
- For your inlay to be a desired size, make the image for the template pattern at least 5/16" larger all around to account for the offset of the bushing and collar.
- Make patterns large enough so the 9/16"-diameter router inlay collar will fit into the pattern openings. Note that rounded corners need to have a 9/32" minimum radius for the 9/16" collar to fit into them.
- For safety's sake, make your template of sufficient size to allow proper support for your router.

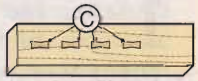
cutting diagram



¼ x 24 x 48" Oak plywood



½ x 7½ x 36" Oak



¾ x 3 x 13" Walnut

½ x 3½ x 24" Oak

*Plane or resaw to the thickness listed in the Materials List.

kitchen trivet

Attractive tiles and contrasting woods give instant eye appeal to these trivets. The featured woods: cherry/wenge (foreground) and bird's-eye maple/wenge (background).

a fast scrapwood project

Here's a different way to put an attractive tile to good use. Build a simple frame for it from contrasting woods, and let it serve as a trivet to protect your precious tabletops and counters. You easily can build this project in an evening, and already may have the items needed on hand: a 6" or 8" square tile of your choice, a couple strips of wood, and a small piece of ⅛" hardboard.

First, measure the size of your tile

1 Measure the actual size of your tile. (Our 6"-square tile actually measured 5⅞" square.) Referring to **Drawing 1**, add 1⅝" to your measurement to determine the length for each frame piece (A). The thickness of the frame pieces, plus a 1/16" gap between the tile and the inside edges of the frame, accounts for the added length.

2 Now, measure the thickness of your tile. You'll need to know it to locate the groove for the bottom (B) later.

Make the parts, assemble, and finish

1 Select two ¾"-thick contrasting woods to form a blank for the frame pieces (A).

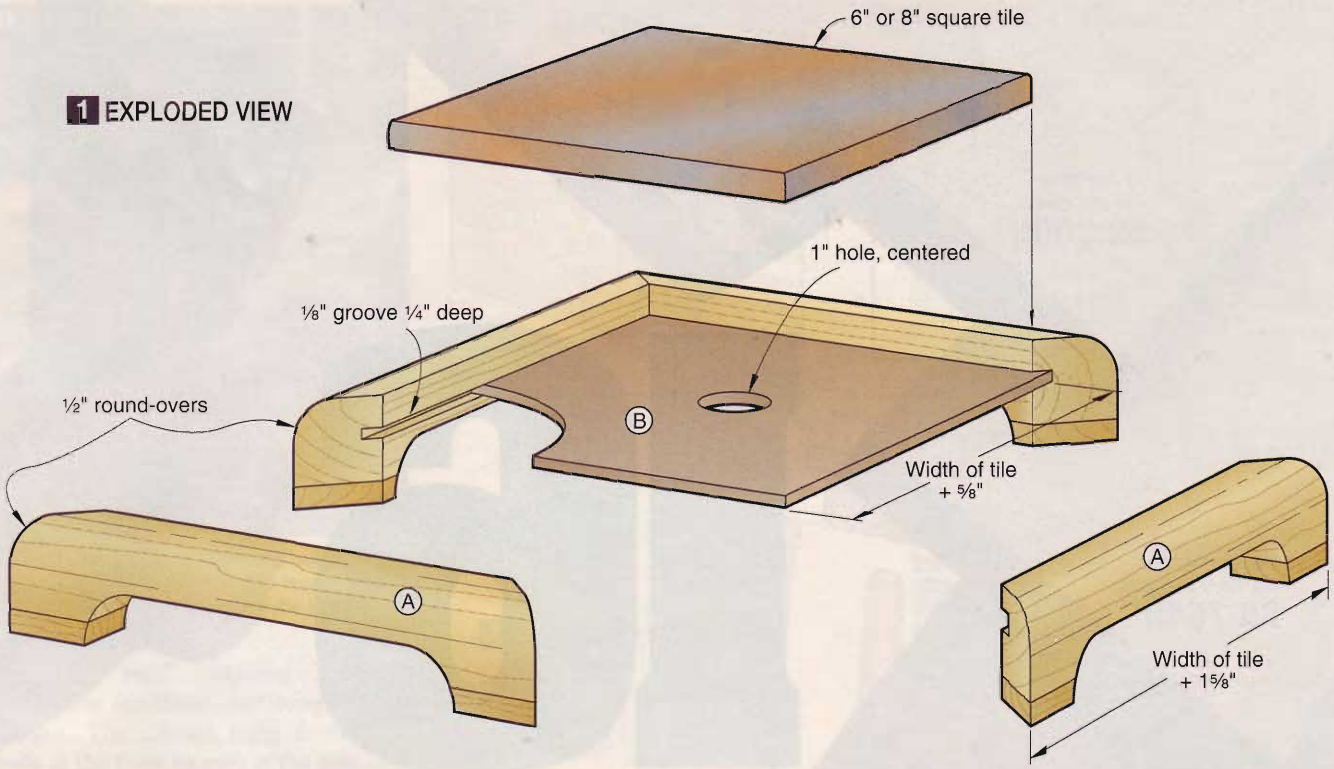
2 From the stock selected for the top of the frame, cut a 1"-wide blank of sufficient length (including at least 2" for waste) to form the frame pieces. From the stock selected for the bottom part, cut a ¼"-wide blank of the same length.

3 Edge-join the blanks to form a ¾×1¼" blank, and sand smooth. Then, rout a ½" round-over along the top outside edge of the blank, where shown on **Drawing 1**.

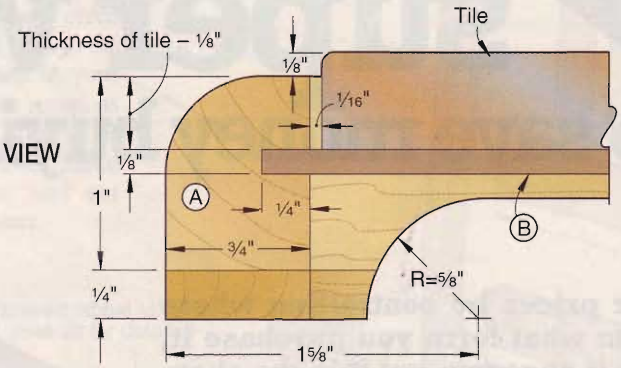
4 Subtract ⅛" from the measured thickness of your tile. The result is the distance from the top of the groove that will receive the bottom (B) to the top of the frame, where shown on **Drawing 1a**. This will set the tile's top ⅛" above the frame, where shown. Cut a ⅛" groove ¼" deep along the inside face of the blank.

5 Miter-cut the blank to form the frame pieces (A) to the length shown on **Drawing 1**. Use an auxiliary

1 EXPLODED VIEW



1a FULL-SIZE SECTION VIEW



extension on your miter gauge as a backer board to prevent chip-out, and use a stopblock to ensure you cut all of the pieces to the same length.

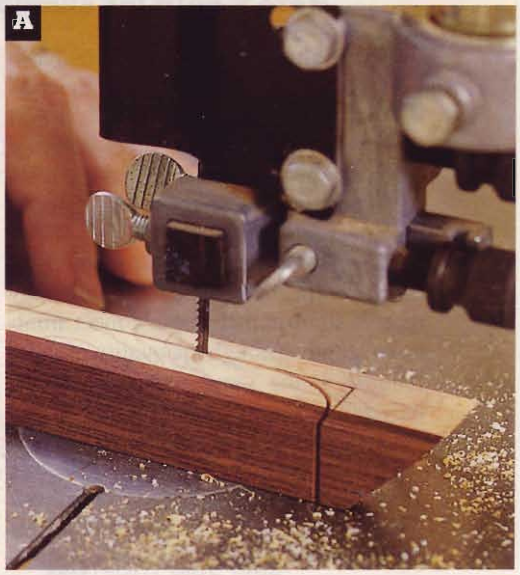
6 Mark the cutout at the bottom of each frame piece by marking a ⅝" radius at each end, where dimensioned, and drawing a line between them. Referring to **Photo A**, bandsaw the cutouts to shape, and sand smooth.

7 From ⅛" hardboard, cut the bottom (B) so it's ⅝" larger than your tile's actual size. Draw diagonals to find the bottom's center, then drill a 1" hole through the bottom, where shown. This hole lets you remove the tile for cleaning or replacement.

8 Dry-assemble the frame and the bottom, and verify a good fit. Then, apply glue in the grooves in the frame pieces and to their mitered ends. Assemble and secure with a band clamp, checking for tight miter joints.

9 Finish-sand the frame to 220 grit, and remove the dust. Apply a clear finish of your choice. (We brushed on two coats of Watco satin polyurethane, sanding to 320 grit between coats.) Now, place your tile in the frame, and put your trivet into service.

Written by **Owen Duvall**
Project design: **Kevin Boyle**
Illustrations: **Roxanne LeMoine**; **Lorna Johnson**
Photographs: **Marty Baldwin**



Bandsaw to the layout line to form the cutout in the frame pieces. Sand to final shape using a drum sander.

16 super ways to save money buying wood

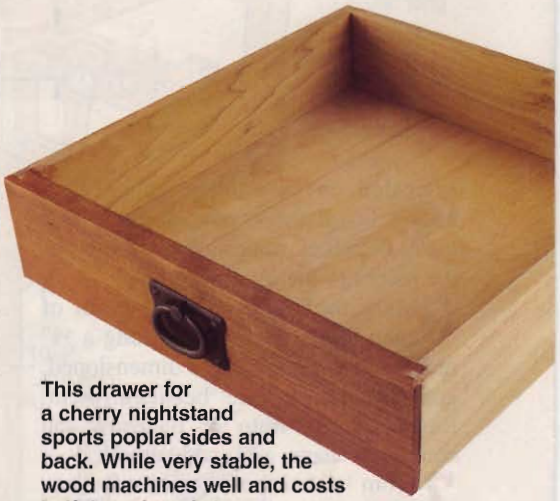
Combat high lumber prices by controlling where you buy your wood, in what form you purchase it, and what you do with it once you get it in the shop. Here's help for shaving costs and saving plenty.

1 Buy short boards. Many hardwood retailers specialize in "Selects" and "Firsts and Seconds" (FAS) grades of lumber. To meet grading requirements (detailed in issue 139), these boards have to be at least 6' or 8' long, respectively.

Oftentimes, dealers have to recut boards with bad spots, or they may receive lumber that doesn't meet minimum length. Though the quality of these "shorts" is the same as higher grades, they sell at a reduced price, often 30–50 percent cheaper than the FAS price.

2 Buy lower grades. The next two grades below FAS and Selects are #1 and #2 Common. These boards are narrower and shorter than the higher grades, and yield fewer clear cuts. But prices can range 30–50 percent lower than FAS. So even if you have more waste, you may have a real bargain. If you can't find #1 Common at your regular dealer, try one that caters to contractors and cabinet shops.

3 Build less-visible parts from lower-cost woods. You don't need to build hidden parts of a project from the same wood as highly visible parts. Drawer carcases, shown *above right*; support frames; spacers; and shelves are prime candidates for less-expensive woods, such as poplar, or for plywood edged with solid stock.



This drawer for a cherry nightstand sports poplar sides and back. While very stable, the wood machines well and costs half the price of cherry.

4 Go for quantity discounts. Many retailers offer price breaks on larger purchases. The first break is often at 100 board feet (bf), but may be as low as 20 bf. And you may be able to mix species and still get the discount.

5 Form a buying group. To save without overbuying, pool your order with friends or fellow woodworking club members. Your dealer may even reward consistent business with discounts for members. If you don't belong to a club, this offers a good reason to join.

6 Shop the sales. We love our lumber, but to dealers, it's just a product that has to move. That means dealers will eventually offer overstocks, special purchases, and even scratch-and-dent boards at discount prices. If you plan your projects in advance, or if you have certain woods you use all the time, take advantage of these sales, even if you don't need the stock right away.

7 Build proper board storage. Thankfully, lumber doesn't spoil, so if you store it properly, you can keep those bargain boards around almost indefinitely. Build a decent lumber rack, such as the one shown *above right*, and stack the boards carefully on sturdy horizontal supports that form a flat plane to keep them from warping or splitting.

Preserve your lumber investment by storing boards flat and off of the floor away from moisture. Find plans for this sturdy rack in the online store at www.woodonline.com.

8 Buy rough-sawn stock. Every milling process increases the price of a board. If you have access to a thickness planer and a jointer, buy rough-sawn stock (dried boards with rough surfaces from the sawmill) and save money doing the final milling yourself.

Many of today's portable planers are up to the task of milling rough stock, as shown *below*, but if you regularly plane a lot of boards, say 100 board feet or more at a time, consider a stationary planer. You'll also need at least a 6" jointer. Benchtop models don't offer power or control for big boards.

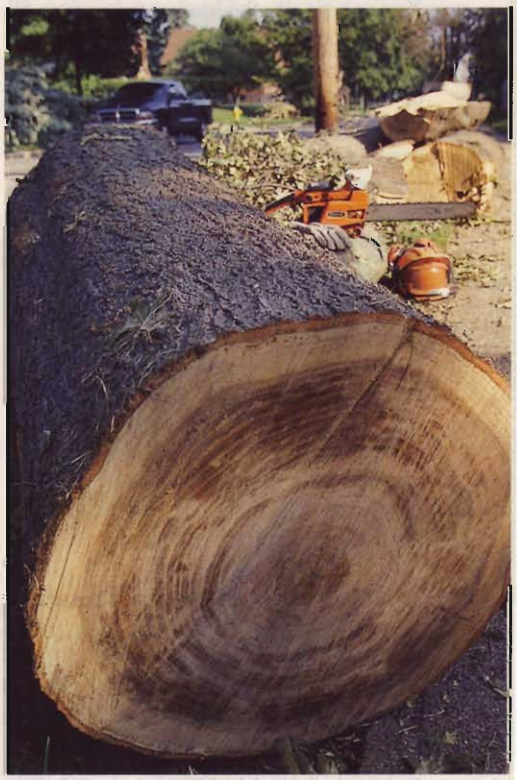
A couple of passes through the planer turn a rough-surfaced board into great-looking lumber.

One problem with buying rough stock is that you can't see the grain. Buy from a reputable dealer and, if possible, take a small hand plane when you shop to peek at what lies beneath the rough surface.

9 Search out a sawmill. If rough-sawn stock is good, mill-direct stock is even better. Buying from a reputable mill eliminates the middleman, and may offer access to a great variety of boards. For example, as little as 25 percent of many logs meets standards for FAS grading, but the remainder produces loads of Selects and common-grade boards. Mills produce custom stock, too, such as quartersawn, thick, or wide boards.

Finding a sawmill in your area may prove easier than you think. Look in your Yellow Pages, contact your county's extension service, or use an online directory. Typing the word "sawmill" in the "category" field at www.qwestdex.com yielded more than 80 listings just in the state of Iowa, where we publish *WOOD®* magazine. Give it a try in your area.

10 Look for local trees. Trees get cut down all the time, often due to old age or storm damage, *right*. You often can acquire these trees free or inexpensively, then have the trunk and major limbs milled. You'll pay fees for milling and drying, but it's akin to just paying for labor on materials you supply. Be aware, however, that some mills reject city-grown trees due to the possible inclusion of metal in the wood.



An ice or wind storm can wreak havoc on trees, but provides a great source of stock. Talk to homeowners or proper officials before removing any downed trees.

Portable mills bring full-service sawing to your site. Costs usually include a setup fee plus a set amount per lineal foot sawn. You'll also pay for blade damage caused by metal in the wood. Even if you don't see nails on the outside, they may be buried within.

11 Seek an on-site sawyer. One problem with harvesting trees is transporting them to the mill. Many sawyers, though, will come to you, as shown *above*. Portable sawmill makers, such as Wood-Mizer (800/553-0182) and TimberKing (800/942-4406), keep lists of mill owners who perform custom sawing services.

You'll pay for these services, of course. Then you'll need to have the wood dried. You can air-dry the lumber (see issues 59 and 97) or even build your own solar kiln (issue 70). However you do it, you'll still be dollars ahead of retail prices. And you may find a great source for lumber because some of these sawyers stockpile logs or know where to find them.

12 Be kind to a cabinetmaker. Professional cabinet and millwork shops generate more scrap lumber in a week than the average hobbyist uses in a year. Their cutoffs can provide you with a wealth of inexpensive kiln-dried lumber, especially for small-scale projects. Build a good relationship with the cabinetmaker, and you might be able to order lumber through him at his discount.

13 Beware of the mass retailer. Home centers offer a great selection of construction lumber and common softwood, but you won't find pros buying hardwoods there. As the opening photo shows, those finely surfaced or shrink-wrapped boards bear a premium price.

Most home centers carry relatively few species, as well, so if you need something other than oak or poplar, you're out of luck. This is true, too, if you need boards more than ¾" thick. In fact, boards sold at that thickness in our area actually measured about 1/32" under, which complicates machining tight-fitting dadoes and other joints.

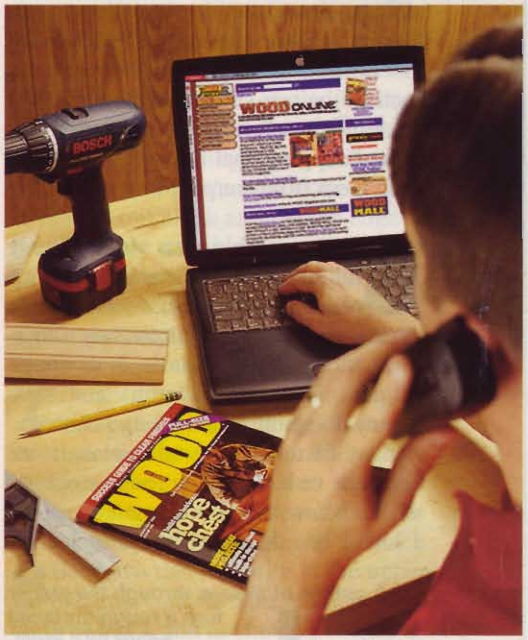
14 Consider counterfeiting. By using the right stain, you can make alder or birch look like cherry. Ash makes a great substitute for oak, and soft maple (which is actually very hard) looks almost exactly like its hard maple cousin. These are just a few examples of substitute woods. In all these cases, the woods cost less than those they impersonate. Remember, a pinch hitter can still slug a home run!

15 Get the most from every board. However you get your boards, make sure you use each one to its fullest potential. You'll have to work around knots, bad grain, and other imperfections, but by carefully laying out your cuts, as shown *below*, you'll get maximum yield with minimal waste.

16 Cruise catalogs and cyberspace. You can order lumber and have it shipped directly to your door from a number of woodworking supply catalogs and Web sites. Prices, believe it or not, are often competitive with local retailers, though you will have to pay shipping. But these sources can be hard to beat for woods not readily available in your area, and especially for exotic species, burls, and blanks for turning and carving.

For help finding both local and online dealers, try www.woodfinder.com, shown in the photo *below*. Or you can turn to online auction sites, such as www.ebay.com. These sites provide sources—both individuals and retailers—for hard-to-find lumber.

Written by **David Stone**
Photographs: **Marty Baldwin**; **Hopkins Associates**



At www.woodfinder.com, you type in the species you're after, and you'll get information on lumber dealers, by state; links to dealers' Web sites; and a wealth of helpful information about lumber.

Use chalk to mark the cuts in each board. Paper patterns, cut slightly oversize, help you visualize each of a project's parts as you create your own cutting diagram.

turn up the lights

oil-candle trio

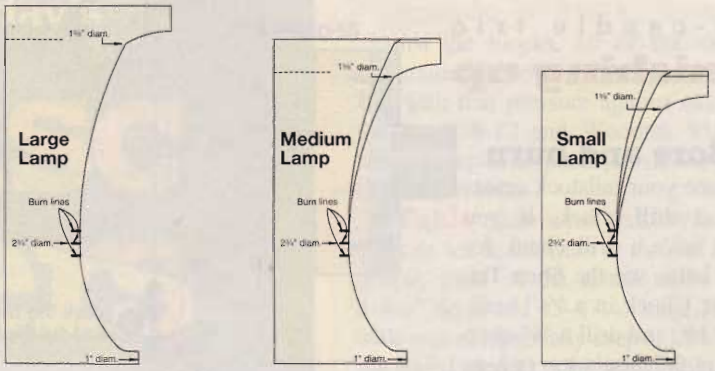
These turned oil candles give off hours of warm glowing light without spilling a drop of wax. You can turn and finish the set of three wood bases in just a few hours, making them a great last-minute holiday gift. And with our handy source for all the necessary parts, you won't have to do any searching on your own.

For the items needed to build this project, see Supplies, Tools and Accessories, and the Buying Guide on *page 64*.

Turn the bases

1 Make the templates

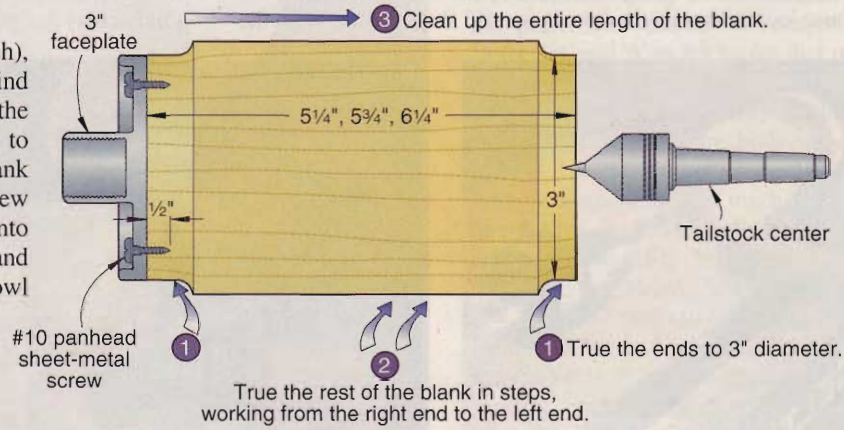
The template patterns for the three oil candle bases are combined, so make three copies of the candle bases full-size template pattern on the *WOOD PATTERNS*® insert. Use spray adhesive to attach them to 2½"-wide pieces of ⅛"-thick hardboard 5⅜", 4⅞", and 4⅜" long. Bandsaw and sand the templates to shape.



2 True the blank

From a 3×3×18" turning square (we used ash), cut base blanks 5¼", 5¾", and 6¼" long. Find the centers by drawing diagonal lines on the bottom of each blank. Use your compass to draw 3"-diameter circles. Center the first blank on your 3" faceplate, drill pilot holes, and screw it in place. The screws should penetrate ½" into the blank. Mount the faceplate on your lathe and engage the tailstock center. Use a ⅜" bowl gouge to shape the blank into a cylinder.

Tool: Bowl gouge.
Tool rest: Below center.
Speed: 600–800 rpm.

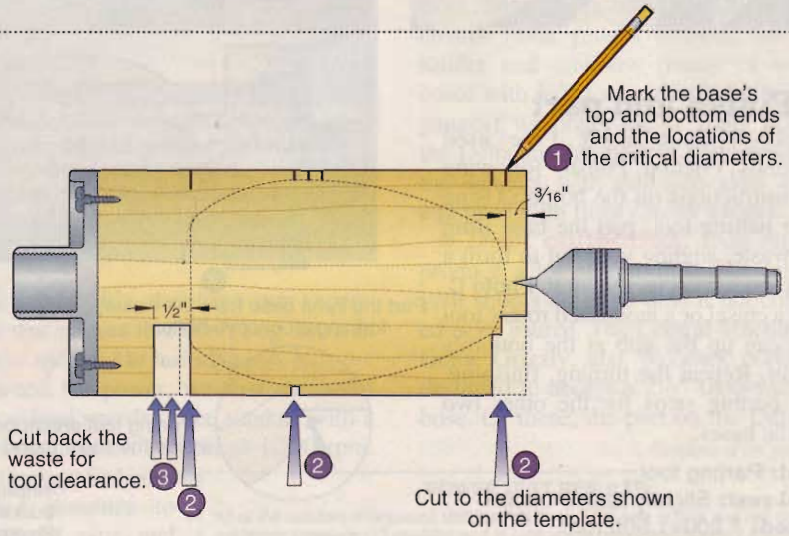


3 Make the gauging cuts

Lay the template on the blank, positioning its bottom end 1" from the blank's bottom (headstock) end. Mark the base's top and bottom and the locations of the critical diameters.

Using a parting tool and outside calipers, make gauging cuts in the blank to the diameters indicated on the template. Gauge the top with a stair-step series of cuts. Widen the gauging cut at the bottom to ½" to provide clearance for your lathe tools when forming the side profile and parting off the finished piece.

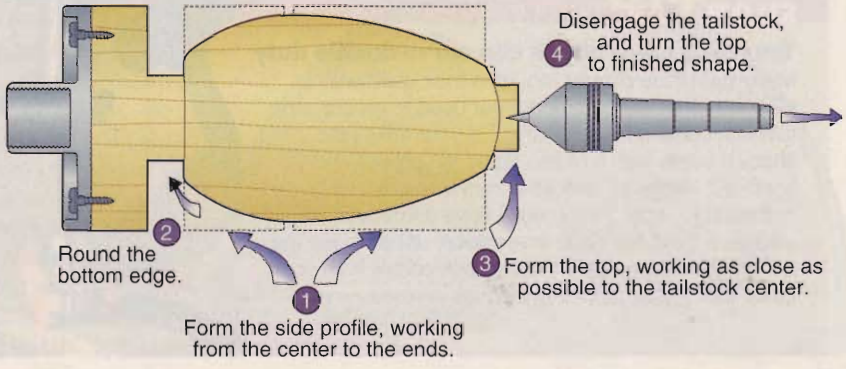
Tools: Parting tool, calipers.
Tool rest: Center.
Speed: 800–1,200 rpm.



4 Form the profiles

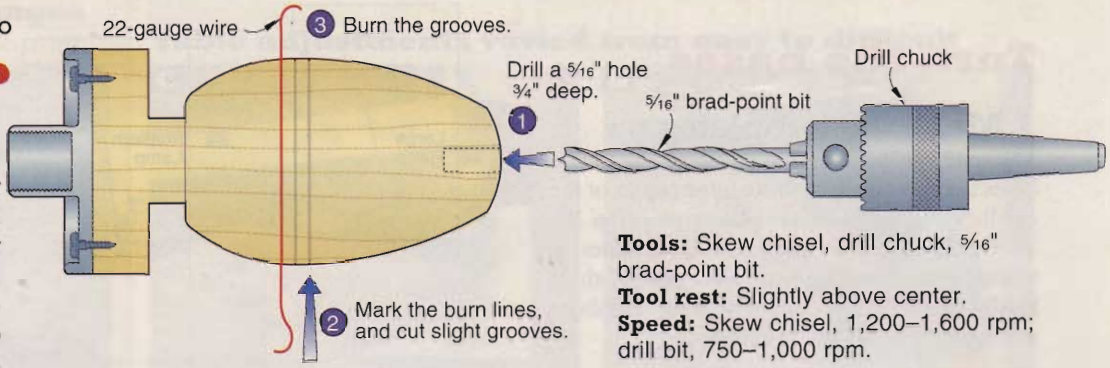
Using a ⅜" spindle gouge, form the side profile. Roll the slight radius where the side meets the bottom. Form the top, working as close as possible to the tailstock center. Disengage the tailstock, and finish shaping the top. Check your profile with the template. Sand with 120- and then 220-grit sandpaper.

Tool: Spindle gouge.
Tool rest: Slightly below center.
Speed: 1,200–1,600 rpm.



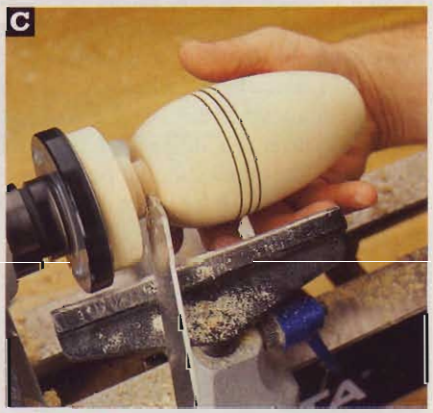
Finishing up

1 Bore and burn



Tools: Skew chisel, drill chuck, 5/16" brad-point bit.
Tool rest: Slightly above center.
Speed: Skew chisel, 1,200–1,600 rpm; drill bit, 750–1,000 rpm.

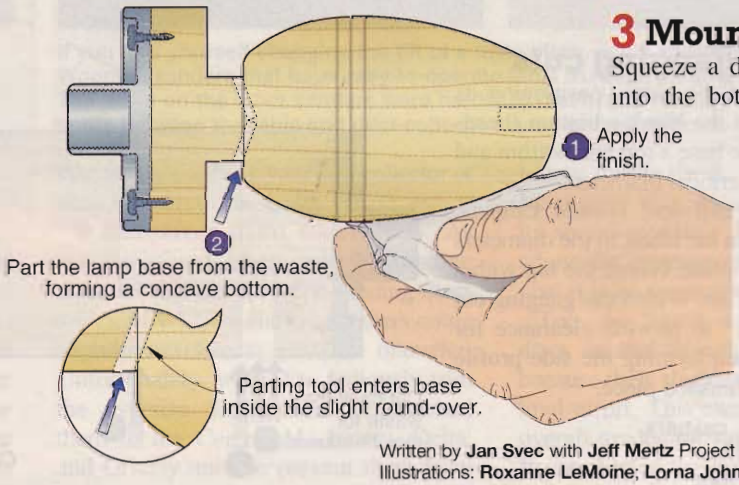
Replace your tailstock center with a drill chuck. If you don't have a drill chuck for your lathe, see the **Shop Tip**, *below*. Chuck in a 5/16" brad-point bit, and drill a 3/4"-deep hole in the base's top end, as shown in **Photo A**. Using your template, mark the locations of the three burn lines on the base with a pencil. Cut slight grooves at these locations with the tip of your 3/4" skew chisel. With the lathe running, hold a piece of 22-gauge wire in each groove, as shown in **Photo B**, until the groove is singed black. Lightly sand across the grooves with 220-grit sandpaper.



2 Finish and part

Apply a clear finish. (We used Mylands Friction Polish, following the instructions on the bottle.) Using your parting tool, part the base from the waste, angling your cut to form a concave recess, as shown in **Photo C**. Use a chisel or a motorized rotary tool to clean up the nub at the bottom's center. Repeat the turning, finishing, and parting steps for the other two candle bases.

Tool: Parting tool.
Tool rest: Slightly above center.
Speed: 1,200–1,600 rpm.



3 Mount the candle

Squeeze a dab of silicone caulk into the bottom of each candle base hole. Insert the oil candles, and adjust them so they sit straight. Let the silicone cure overnight.

Written by **Jan Svec** with **Jeff Mertz** Project design: **Kip Christensen**
Illustrations: **Roxanne LeMoine**; **Lorna Johnson**
Photographs: **Marty Baldwin**

SHOP TIP

Your drill-press chuck can serve double duty

Many drill-press chucks mount to their quills with a #2 Morse taper, a common taper used to mount lathe tailstock centers to the tailstock. If your drill-press chuck mounts with a Morse taper, simply use the knockout wedge to remove it from the quill, as shown in the photo, *right*. (If you don't have a knockout wedge, a stout flat-blade screwdriver will do.) Use the knockout bar to remove the tailstock center from your lathe, then lightly tap the drill chuck in place.

Supplies: 1/8" tempered hardboard for the templates, spray adhesive, 3x3x18" ash turning square, 22-gauge wire, silicone caulk.

Tools and Accessories: 3" faceplate, 3/8" bowl gouge, parting tool, 3/8" spindle gouge, 3/4" skew chisel, outside calipers, drill chuck, 5/16" brad-point bit.

Buying Guide

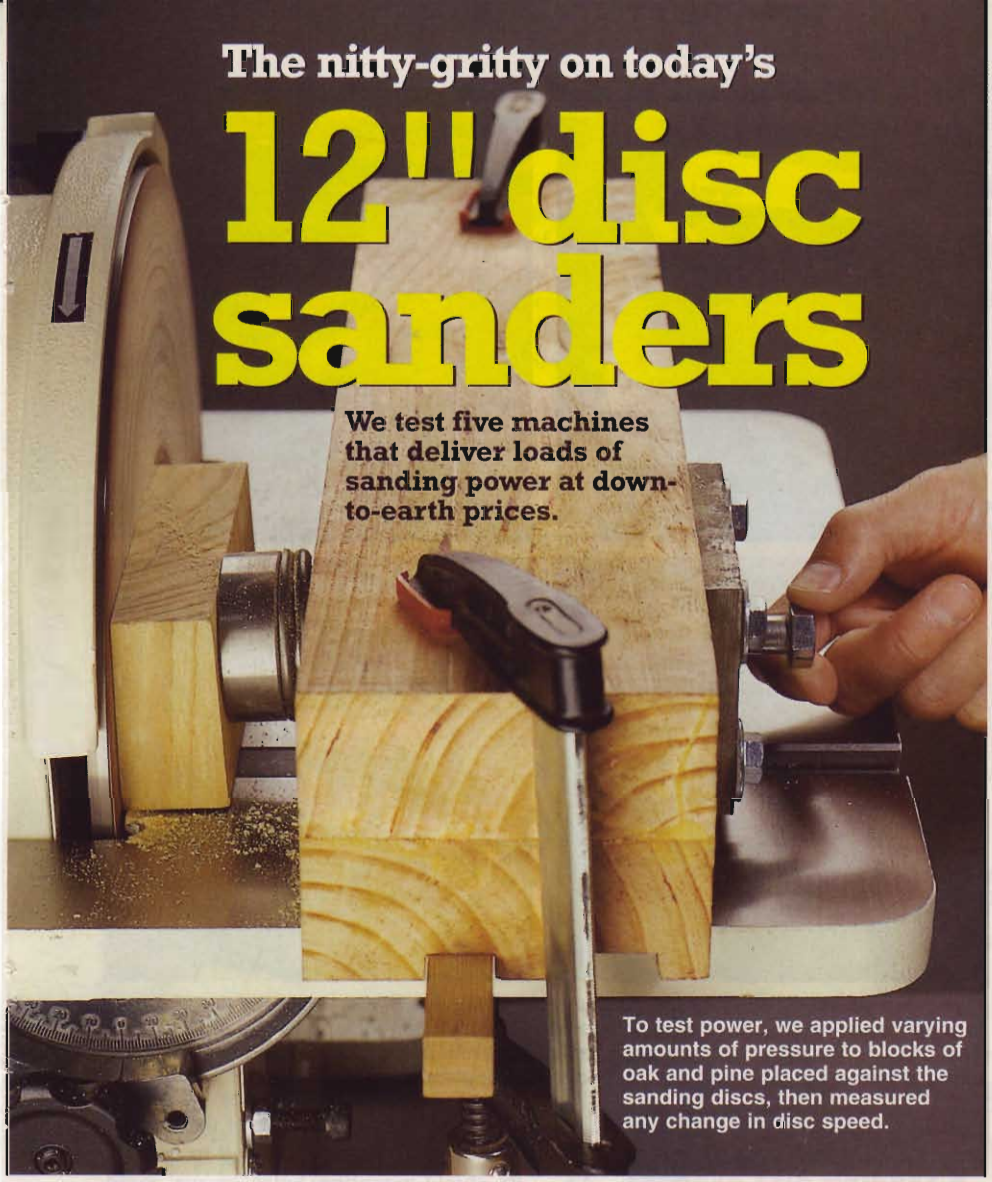
Finish, oil candles, and lamp oil. Mylands Friction Polish (4-ounce bottle), teardrop oil candles (3), lamp oil (8 ounces). Kit no. 913-0105, $35.00 ppd.

Finish, candles, oil, and wood. Items above plus a 3"-diameter ash turning blank 18" long. Kit no. 913-0106, $44.00 ppd. Kit prices reflect a discount for *WOOD*® magazine readers. Craft Supplies USA. Call 800/551-8876, or go to www.woodturnerscatalog.com.

The nitty-gritty on today's

12" disc sanders

We test five machines that deliver loads of sanding power at down-to-earth prices.



To test power, we applied varying amounts of pressure to blocks of oak and pine placed against the sanding discs, then measured any change in disc speed.

What a disc sander will do for you

A disc sander deserves a place in nearly every shop because it does so many tasks with both power *and* finesse. For example, you can precisely hog off lots of material in no time from edges or ends, say when sanding up to a marked outside radius or shaping a perfect circle. You can also fine-tune a miter-cut frame piece or turning segment for a perfect fit, or chamfer a dowel end with great control. Whatever the task, you can trust that the flat disc backing the abrasive (called a *platen*) will ensure an absolutely flat sanded surface with crisp edges.

Five features that define these machines

■ **Power.** You don't want a disc sander to slow down during normal usage, so we consider power to be a prime consideration when choosing the right model. It's also been our experience that motors that don't bog down in typical use tend to last longer.

To test for power, we first measured the no-load speeds of the sanders with a phototachometer. All ran at 1,790 rpm. We then applied controlled pressure to blocks of pine and oak against the spinning discs, as shown *above*. With a moderate sanding pressure of 13 pounds applied against the blocks, all of the sanders maintained a speed of 1,700 rpm or more in both oak and pine.

With a heavier sanding pressure of 19 pounds applied against the blocks, all of the sanders maintained at least 1,700 rpm in pine. But with that pressure against oak only the Jet JDS-12 and Woodtek 958-357 ran at acceptable speeds, as shown in the illustration *below*.

■ **Table size and material.** As you can see in the chart at *the end of this article*, most of the tested tables were 8–8⅞" deep, and 15–17¼" long. The Jet table was exceptionally deep at 12⅝", giving added support to larger workpieces.

All of the tables were sufficiently flat and attached rigidly to the sanders. We did prefer the smooth surfaces on the Delta, Jet, and Woodtek tables that made it easy to manipulate project pieces while holding them firmly down. The Delta and Jet tables (**Photo A**) are both smoothly ground cast iron; although the Woodtek table is aluminum, it is much smoother than the roughly finished aluminum tables on the essentially identical Central Machinery and Grizzly sanders (**Photo B**).

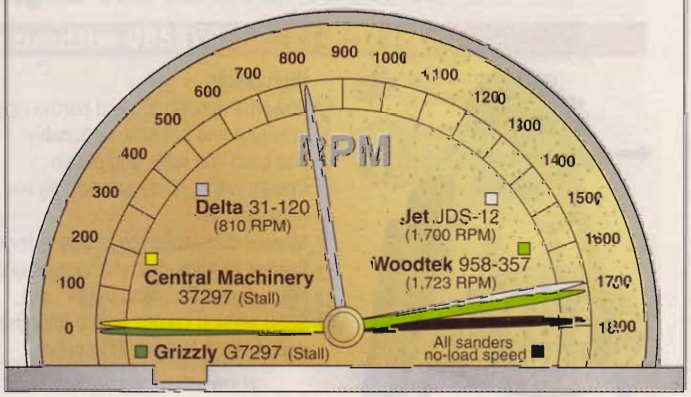
■ **Miter-slot size.** Except for the Delta and Jet sanders, which come with standard-size ¾" miter slots, the tested sanders come with smaller, odd-size slots. Because we find it handy to interchange miter gauges between our disc sander and tablesaw (many of which come with ¾" slots and well-built miter gauges), we prefer the ¾" miter slots in the Delta and Jet models. Unfortunately, the sanders with odd-size slots come equipped with flimsy miter gauges.

■ **Dust collection.** Disc sanders produce a lot of fine dust that can fill your shop's air in no time if not collected at its source. The Central Machinery, Delta, Grizzly, and Woodtek ports are designed to accept a 2½" shop-vacuum hose. Of these, the port on the Delta fit

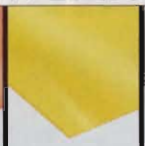
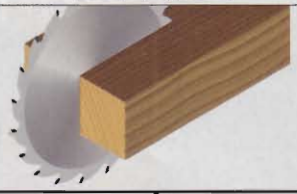
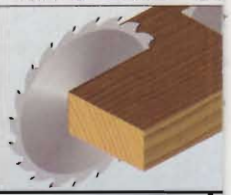
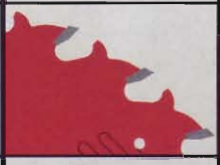
Continued on page 66

POWER TEST RESULTS

All of the sanders maintained disc speeds over 1,700 rpm in pine and red oak under moderate pressure (13 pounds) and in pine under heavy pressure (19 pounds). But, in red oak under heavy pressure, two units stalled and one slowed considerably.



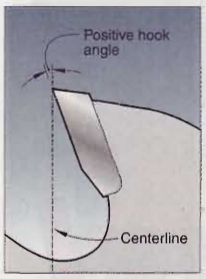
WOOD® guide to choosing 10" c

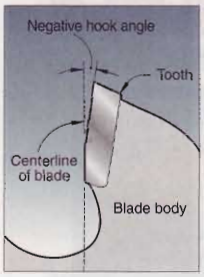
FOR THIS CUT	FERROUS	NONFERROUS			RIPPING		RIPS AND CR
	Construction Irons and Steels	Copper	 Brass	Aluminum			
Material Thickness	Up to ¼" wall thickness	Up to ¼" thickness		Up to 1/16" thickness	¾" to 2¾"	1" and less	⅜" to 1" for rips; ¾" to 3½" for crosscuts
Application	Cutting flat bar, angle iron, black pipe, and all-thread	Cutting **thick** copper, aluminum, and brass		Cutting **thin** copper, aluminum, and brass	Heavy-duty ripping of **thick** hardwoods, softwoods, and veneered plywoods	Ripping hardwoods, softwoods, and veneered plywoods	Hardwoods, softwoods, and veneered plywoods
USE THIS BLADE							
	Ferrous	Nonferrous		Nonferrous	Fast and heavy-duty rip	Glue-line rip	General purpose
Tooth Count	50	72		100	24	30	40
Tooth Design	Triple Chip	Triple Chip		Triple Chip	Flat Top	Triple Chip	Alternate-Top Bevel
Hook Angle	0 degrees	-7 degrees		5 degrees	20 degrees	12 degrees	18 degrees
2nd Choice Blade	None	None		None	30T TC	24T FT	50T Combination

Increasing Impact Strength

Impact Resistant - Softer carbide blend able to withstand extreme cutting impact.

HOW CARBIDE FORMULATIONS CHANGE TO SUIT BLADE APPLICATION





Understanding hook angles

As shown in the drawing, *left*, the carbide tip angled positively pitches forward. The more positive the angle (expressed in degrees), the more aggressive the cut. (Downside: There's a greater chance of kickback with aggressive blades.)

Some specialty materials, including metals, demand zero to negative hook angles. Radial-arm and sliding mitersaws require negative hook blades to push down the stock during the cut.

Tooth grinds

Flat Top (FT). Popular in ripping blades because they're less apt to follow the grain. Blade holds sharpness well.

Alternate-Top Bevel (ATB). Tops of teeth ground to alternate angles or bevels. Finest of cuts—actually shearing the wood. The steeper the bevel, the finer the cut. The downside: High ATB blades dull quicker than others.

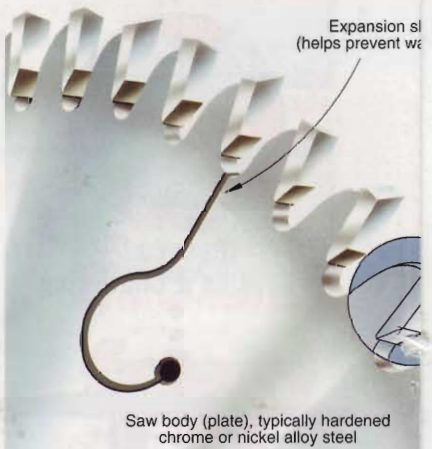
Alternate-Top Bevel and Raker (ATB&R or Combination). Four ATB teeth preceded by a raker (FT tooth) and a deep gullet for fast chip removal. Cuts well with and across the grain.

Triple Chip (TC). Between every flat top tooth is a tooth with the corners ground off. TC blades cut a wide range of materials and hold sharpness well.

What's the difference between general purpose and combination blades?

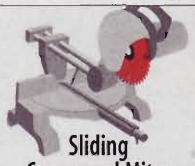
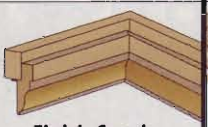
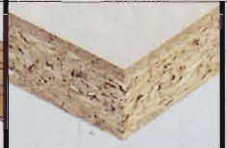
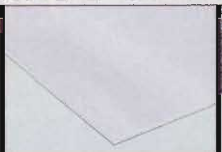
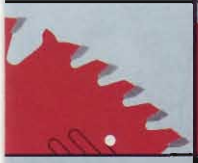
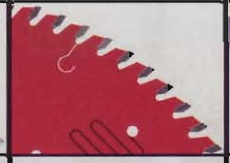
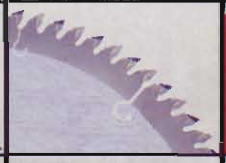
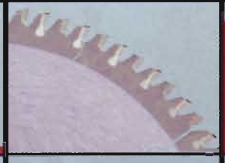
Combination. Traditional favorite. Four ATB teeth preceded by a raker (FT tooth) and a deep gullet.

General purpose. Gaining in popularity over combination blades. Evenly distributed gullets and ATB teeth help the blade outperform most combination blades.



:arbide-tipped blades

Sponsored by freud

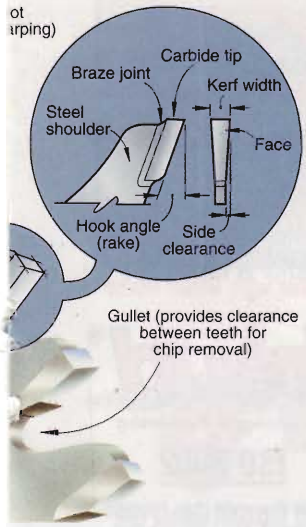
ROSSCUTS	CROSSCUTTING			MAN-MADE MATERIALS		
	 Sliding Compound Miter	Solid Woods	 Finish Cuts in Moldings and Veneer	 Melamine and Laminates	 Plastic	Solid Surface
1/4" to 1 1/2" for rips; 3/4" to 3 1/2" for crosscuts	1/2" to 2 3/4"	1/4" to 1 5/8"	1/4" to 1 5/8"	1/4" to 1 5/8"	1/4" to 1 5/8"	1/4" to 1 5/8"
Hardwoods, softwoods, and veneered plywoods	Hardwoods and softwoods	Crosscutting hardwoods, softwoods, and veneered plywoods	Hardwoods, softwoods, moldings, veneered plywoods, and double-sided laminates	Chip-free cutting on double-sided laminates, melamine, particleboards, and plywoods	Acrylic, polycarbonate, and vinyl	Swirl-free cutting in solid-surface materials, such as DuPont Corian®
						
Combination	Sliding compound miter	Precision crosscut blade	Molding, veneers, hardwoods, and laminate finish cuts	Double-sided laminate and melamine	Plastic	Solid surface
50	60	80	80	80	80	72
ombination	Alternate-Top Bevel	Alternate-Top Bevel	High-Alternate-Top Bevel	Triple Chip	Modified Triple Chip*	Triple Chip
10 degrees	-5 degrees	10 degrees	2 degrees	-3 degrees	-3 degrees	0 degrees
General Purpose 40T ATB	80T TC	80T High ATB	80T ATB	80T High ATB	None	80T Modified TC

Increasing Hardness

*Slightly modified to reduce buildup of waste material.

Extra Hard Carbide - Maintains a sharp edge for clean cuts and long life between sharpenings.

Manufacturers add a higher percentage of titanium and cobalt to a carbide mixture for maximum impact resistance when cutting hard materials, such as metals. Softer materials, which don't require as much impact resistance, are best sawn with blade teeth having less cobalt and titanium but more tungsten carbide for greater cutting-edge hardness and longer life between sharpenings.



WOOD magazine's recommended starter set of blades

It's challenging to recommend a blade lineup for every shop, but here's a trio that most woodworkers would be hard-pressed to live without:

- **40T ATB General Purpose** — crosscuts and rips many materials
- **24T FT Rip** — ideal for hardwoods and thick softwood stock
- **80T ATB Finish** — a blade to rely on for finish cuts

Telltale signs of a dull blade

- Burn marks on both sides of material
- Slower feed rate required
- Undesirable burnished (polished) end grain
- Pitch buildup on teeth
- Visible chips in the teeth
- Drag a fingernail across one tip. Can't nick your nail? It's time to resharpen.

How do I find a great sharpening shop?

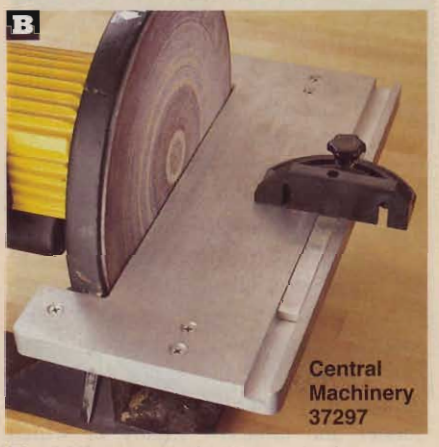
- Follow recommendations of other woodworkers or millwork shops in your area to select a reputable shop.
- Ensure the shop wet-grinds blades with computer-controlled equipment.
- Ensure the shop uses high-quality machines to grind the carbide face and tops, doing so in separate steps.

5 tips to extend blade life

- When using a metal-cutting blade, apply a small amount of WD-40 to the blade body (not teeth).
- When you change a blade, wipe off built-up sawdust from the arbor.
- Never stack blades or lay a blade on a metal surface.
- To clean a blade, soak it in kerosene overnight, scrub with a toothbrush, and wipe clean.
- Blade stabilizers reduce runout (also known as wobble), which extends the life of the blade, improves the quality of the cut, and reduces noise.

For more information on choosing the appropriate saw blade visit **www.freudtools.com**

What extra money brings to miter gauges and tables



The highest-priced machine in the test, the Jet JDS-12, comes with a sturdy, all-metal miter gauge and smooth, cast-iron table. The lower-priced Central Machinery 37297 has a miter gauge with a plastic head, and a rougher brushed-aluminum table.

Table adjustments varied from easy to difficult

If you find yourself changing the tilt of a table often, you'll appreciate the Jet and Woodtek sanders that have easy-to-operate table trunnion-locking knobs or levers. The locks on the other sanders were harder to reach, and rotating their levers in tight spots between the table and dust-collection hose proved difficult.

our shop vacuum's hose snugly; we had to shim the other ports with tape to make a good connection.

The Jet JDS-12 has a unique built-in dust-collection system, with an impeller that draws dust into its own filter. (See photo *below*.) It's a nice feature if you don't have a dust collector or don't want to take the time to hook your dust collector or shop vacuum to the sander's port.

■ **Sanding disc changes.** As we discovered when ordering sanding discs for these tests, some sanding discs are exactly 12" in diameter; others come slightly oversize at 12⅛" in diameter. Unfortunately, we had to tediously trim the oversize discs when we attached them to the Central Machinery, Delta, and Grizzly units to prevent them from hitting shields. In the case of the Central Machinery unit, we also had to enlarge its shield-mounting holes so we could adjust the position of the shield to prevent it from contacting the disc.

Too, we found it easiest to change discs on the Jet and Woodtek sanders because their shields came off with minimal effort. This earned those units top overall grades for sanding disc changes in the chart at *the end of this article*.

A close look at the highs and lows of each sander

Jet JDS-12, $380 ($280 without stand and dust filter), www.jettools.com, 800/274-6848

High points

- Powerful enough to sand hardwoods with heavy pressure and not slow noticeably.
- Has cast-iron table and platen.
- Comes with a circle-sanding jig and a good-quality miter gauge.
- Manual disc brake stops disc quickly.
- Easiest sanding disc changes among tested units.
- Miter gauge fits standard ¾" slot.
- $380 version comes with a filter that collects dust propelled into it by built-in impeller.

Low points

- Most expensive machine in test.
- 90° stop has some slop, and its steel setscrew mars the cast-iron tabletop. (Jet's John Otto tells us the slop has been removed on new units, and that a hard-plastic cap has been added to the setscrew to prevent marring.)
- Nonadjustable table-angle pointer is difficult to read.

More points

- It's the heaviest machine in the test by far at 135 pounds (the Delta is next heaviest at 72 pounds). Although not portable, the Jet's weight gives it stability and dampens vibration for stationary use.

Woodtek 958-357, $190, www.woodworker.com, 800/645-9292

High points

- Portable with lightest weight in test (63 pounds) and carrying handles.
- Has holes for bench mounting.
- Powerful enough to sand hardwoods under heavy pressure.
- Table-angle scale proved accurate and adjustable.
- The only tested model with an above-table shield (removable) that covers the side of the disc that should not be used.

Low points

- No rubber feet to hold it still when not mounted.
- The only tested sander with no means of adjusting the table in and out in relation to the disc.
- Odd-size miter-gauge slot requires you to use supplied flimsy miter gauge.

More points

- This is the disc sander to buy if you can't afford the Jet.

Central Machinery 37297, $125, www.harborfreight.com, 800/423-2567

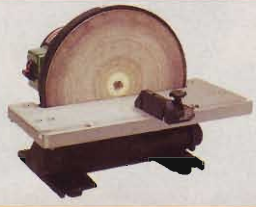
High points

- Lowest price in test.
- Portable at 65 pounds.

Low points

- Odd-size miter-gauge slot requires you to use supplied flimsy miter-gauge.
- Stalls when hardwoods sanded using moderate force.
- No adjustable pointer for table-angle scale.
- No holes in base for mounting to bench.
- Oversize sanding discs hit shield until we trimmed discs; we had to enlarge the shield-mounting holes in order to move the shield.

Grizzly G7297, $130, www.grizzly.com, 800/523-4777



More points

- Essentially the same unit as the Central Machinery model. It did, however, have less disc runout (.006" versus .013" for the Central Machinery unit). And, we didn't have to enlarge the Grizzly's shield-mounting holes.

Delta 31-120, $150, www.deltamachinery.com, 800/438-2486

High points

- Cast-iron table and platen.
- Table stops at 90° and 45°.
- Has holes for bench mounting.
- Manual disc brake stops disc quickly.

Low points

- Trunnion-locking levers proved inconvenient, particularly with table in tilted position.
- Oversize (12⅛") sanding discs hit shield and had to be trimmed after being applied.

More points

- Middle-of-the-road power (slows, but doesn't stall when hardwoods applied with heavy pressure).
- Doesn't come with a miter gauge, but accepts standard miter gauges with ¾"-wide bars.
- The only tested machine with a table that tilts 45° down *and* up. We rarely have need to tilt the table up, but—should you ever sand a compound-cut edge— you may.

And the winners are . . .

Not surprisingly, the most expensive machine in the test, the Jet JDS-12, was the top performer and earns our "Top Tool" recognition. We think it's worth every penny because of its solid performance and bevy of standard features and options.

Among the lower-priced units, the Woodtek earns our "Top Value" recommendation. It has few frills, but its power will please you.

Written by **Bill Krier** with **Garry Smith**
Photographs: **Marty Baldwin**
Illustration: **Tim Cahill**

HOW THE TESTED DISC SANDERS COMPARE

BRAND	MODEL	SIZE (LENGTH, DEPTH)	TABLE: MATERIAL (1)	TABLE: NUMBER OF STOPS	TABLE: ADJUSTABLE 0° TILT MARK (YES, NO)	TABLE: SLOT SIZE (INCHES)	TABLE: DISC BRAKE (YES, NO)	PERFORMANCE REPORT CARD (2): EASE OF CHANGING SANDING DISCS	POWER	EASE OF DUST COLLECTION	EASE OF TABLE ADJUSTMENTS	MITER GAUGE QUALITY (3)	STANDARD ACCESSORIES (4)	WARRANTY (YEARS) (5)	COUNTRY OF ASSEMBLY (6)	WEIGHT (POUNDS)	SELLING PRICE (7)
CENTRAL MACHINERY	37297	17¼ x 8⅜"	AL	1	NO	.711	NO	C	C	C	C	C	MG	*1	C	65	$125
DELTA	31-120	17¼ x 8¾"	CI	3	YES	.755	YES	C	B	B	C-	*	DH	2	C	72	150
GRIZZLY	G7297	17¼ x 8⅜"	AL	1	NO	.710	NO	C	C	C	C	C	MG	1	C	68	130
JET	JDS-12	16½ x 12⅝"	CI	2	NO	.748	YES	A	A	A	A	A	CS, DC, MG, ST	2	T	135	280/380*
WOODTEK	958-357	15⅜ x 8⅞"	AL	0	YES	.639	NO	A	A	C	A	C	MG	1	T	63	190

NOTES:

1. (AL) Aluminum (CI) Cast iron
2. A Excellent, B Good, C Average
3. *Machine not equipped with miter gauge. Accepts standard gauges with ¾"-wide bars.
4. (CS) Circle-sanding pin for miter slot (DC) Dust-collection filter (DH) Dust hose (MG) Miter gauge (ST) Stand
5. *Except for electrical components that have a 90-day warranty.
6. (C) China (T) Taiwan
7. Prices current at time of article's production and do not include shipping, where applicable.

* $380 with stand and dust filter. $280 without stand and dust filter.

two-in-one

arts & crafts chair

Build either a handsome armchair or rocker from the same basic plan. Mortise-and-tenon construction and perfectly proportioned comfort will guarantee its place as a family heirloom.

See more . . .

...Mission furniture plans at
www.woodstore.woodmall.com/misfur.html

Morris chair, prairie sofa, rocking chair—these pieces form the trinity of Arts & Crafts seating. We featured the Morris chair in issue 112 and the sofa in issue 129. Now to complete the circle, we present the rocker, or if you like, the classic armchair.

This design, in quartersawn white oak, delivers the Arts & Crafts style's essential simple lines, while avoiding overbearing mass. We incorporated mortise-and-tenon joinery and laminate-bent rockers (should you go that route), but sidestepped many tricky details with our simplified construction.

For the items needed to build this project, see the Cutting Diagram and Materials List on *page 76*.

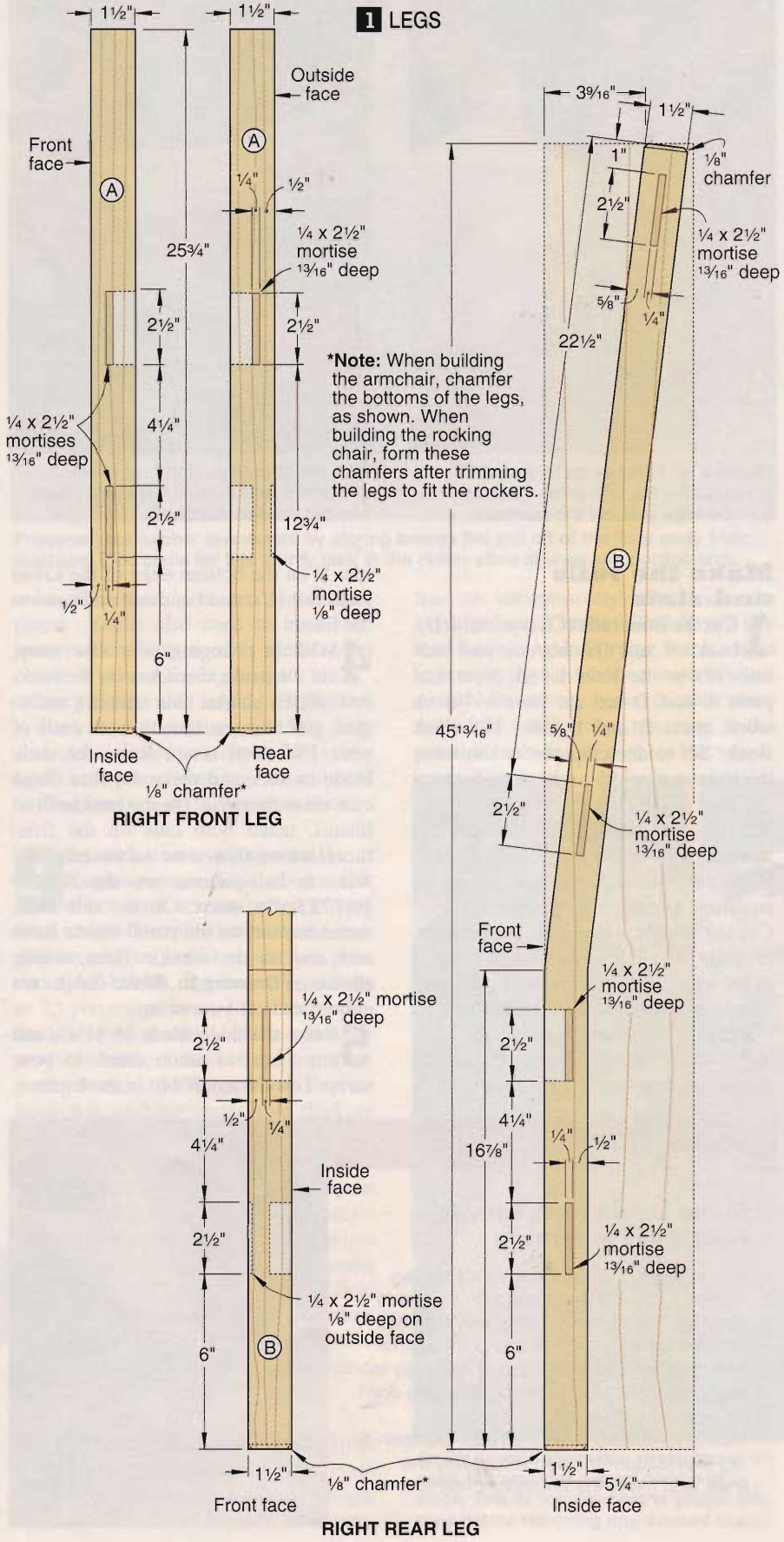
Start with the legs

1 Plane 1¾"-thick stock to 1½" thick for the front legs (A) and the rear legs (B). To reduce waste, nest the front and rear legs, as shown on the Cutting Diagram, and then bandsaw individual leg blanks. Cut the front legs to the size listed in the Materials List. Lay out the rear legs, shown on **Drawing 1**. Bandsaw and sand the rear legs to the layout lines. Crosscut the top ends perpendicular to the legs' front faces.

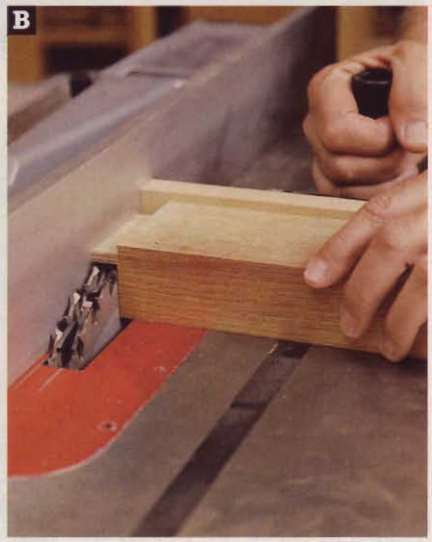
Note: *The legs, as dimensioned, are the proper length for the armchair. If you are building the rocking chair, you will trim them to the proper length later.*

2 Lay out the mortises on the front and rear legs, where shown. Note in the Materials List that these parts are *plainsawn* white oak. Because the *edge* grain of this stock displays quartersawn ray patterns, the front faces of the rear legs will display this pattern. Be sure to orient the front legs' ray-patterned faces to the front. Make certain that you have mirrored pairs of legs. See the **Shop Tip** on *page 70*, for a layout tip. Drill the mortises, as shown in **Photo A**. Clean up the sides of the mortises, and square the ends with a chisel.

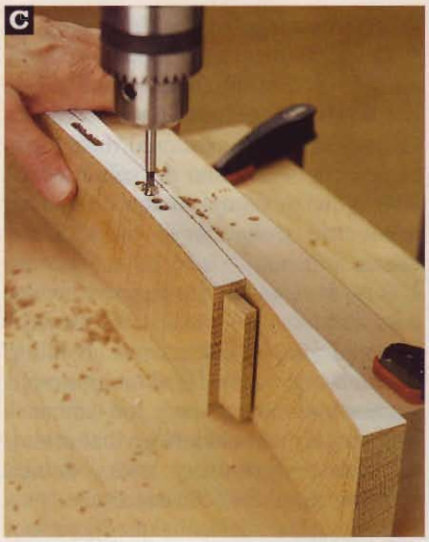
3 Chuck a chamfer bit in your table-mounted router, and rout ⅛" chamfers on the tops of the rear legs, where shown. If you are building the armchair, chamfer the bottom ends of the front legs (A) and the rear legs (B).



Chuck a ¼" Forstner bit in your drill press. Using the drill-press fence to position the legs, drill out the mortises.



With the shoulders and first cheek cut on parts E and F, raise the dado blade, and cut the second cheek.



To position the backrest rails when drilling the mortises, adhere an outside waste piece to the fence with double-faced tape.

Make the rails and slats

1 Cut the front rails (C), rear rails (D), backrest rail (E) blanks, and side rails (F) to the sizes listed. Note that parts C and D are cut from ¾"-thick stock, parts E and F from 1¾"-thick stock. Set aside scrap pieces the same thickness and width as the parts for testing your tenon cuts.

2 To cut tenons on the front rails (C) and rear rails (D), install a dado blade in your tablesaw, and attach an auxiliary extension to the miter gauge. Cut the tenons, shown on **Drawing 2a**, on your ¾"-thick scrap, and test the fit in the legs' mortises. Then cut the tenon cheeks and shoulders on the rails.

3 Rout a ¼" chamfer along the edge of the upper front rail (C), where shown on **Drawing 2**. Lay out the shallow V on the bottom edge of the lower front rail (C), and bandsaw and sand to the line.

4 Without changing your saw setup, cut the tenon *shoulders* on the backrest rail (E) blanks, side rails (F), and to give you two test tenons, both ends of your 1¾"-thick scrap. Raise the dado blade to 5/16", and make the first *cheek* cuts on these parts. On the backrest rail blanks, make both cuts on the front faces, where shown on the backrest rail full-size half-patterns on the *WOOD PATTERNS*® insert. On the side rails, make one cut on the parts' inside faces and one on the outside faces, where shown on **Drawing 2b**. Make cheek cuts at both ends of your scrap.

5 Raise the dado blade to 13/16", and cut a second tenon cheek in your scrap. Test the tenon's fit in the leg mortises, and make any necessary adjustments. Cut the second tenon cheeks in parts E and F, as shown in **Photo B**.

6 Make two copies of the backrest rail full-size half-patterns on the pattern insert. Using spray adhesive, adhere the patterns to the bottom edge of the top rail blank and the top edge of the bottom rail blank, joining the halves where indicated. Bandsaw the rails just outside the pattern lines, then use a random-orbit sander to sand to the lines. Save the waste pieces.

7 Chuck a ¼" Forstner bit in your drill press, and drill the back slat mortises in the backrest rails, where shown on the patterns, and as shown in **Photo C**. Clean up the sides of the mortises, and square the ends with a chisel.

8 Bandsaw the V profile in the upper backrest rail, where dimensioned on **Drawing 2**, and as shown in **Photo D**. Remove the waste pieces, and sand the profile smooth.

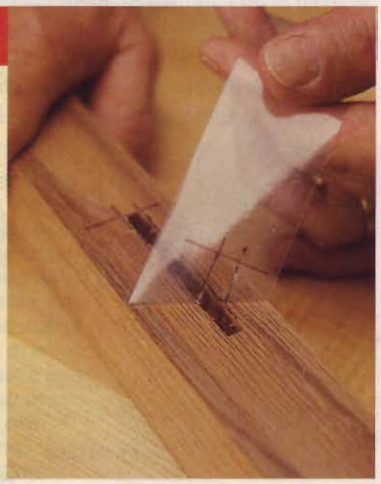
9 To locate their tapered rabbets, pair up the two side rails (F) with the front tenons 5/16" from the rails' outside faces and the rear tenons 5/16" from the inside faces. Mark their inside faces and top edges. Draw the taper lines for the outside faces on their top edges, where shown on **Drawing 2b**. Bandsaw to the lines, and then sand the faces smooth. Adjust a ⅝" dado blade in your tablesaw to cut ½" deep. Position the rip fence ¾" from the blade. With their outside faces against the fence and top edges down, make the first cut for form-

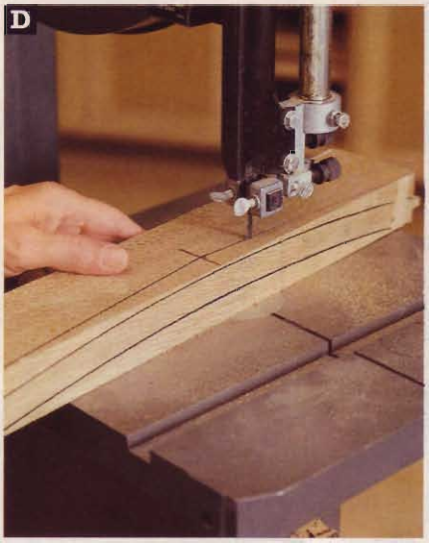
SHOP TIP

Make layout lines easy to read, easy to remove

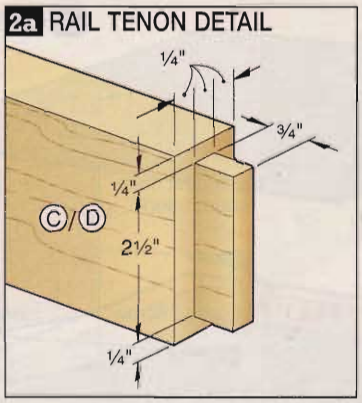
Before laying out the locations of the leg mortises, cover the surface with 1½"-wide clear packaging tape. Then draw the lines on the tape with an ultra-fine-point permanent marker. The layout marks are easy to read, and peel off with the tape so you don't have to sand them off.

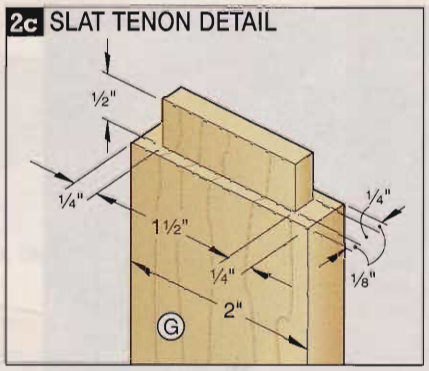
Make a mistake in your layout? Dampen a rag with lacquer thinner, wipe away the lines, and make the necessary correction.





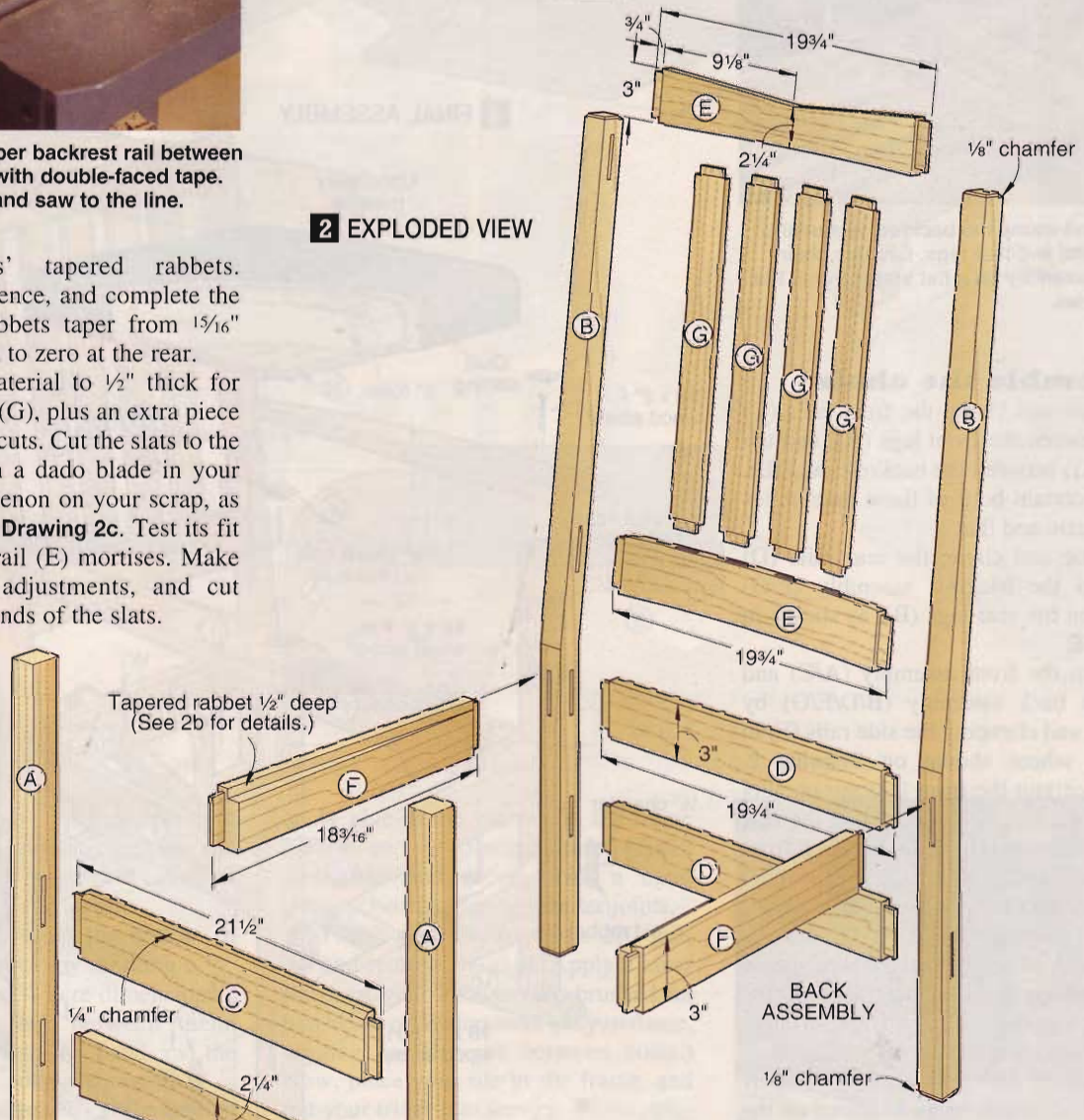
Sandwich the upper backrest rail between its waste pieces with double-faced tape. Draw the profile and saw to the line.

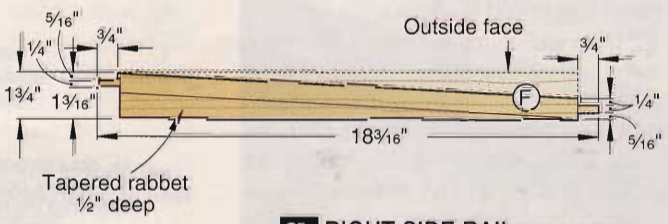




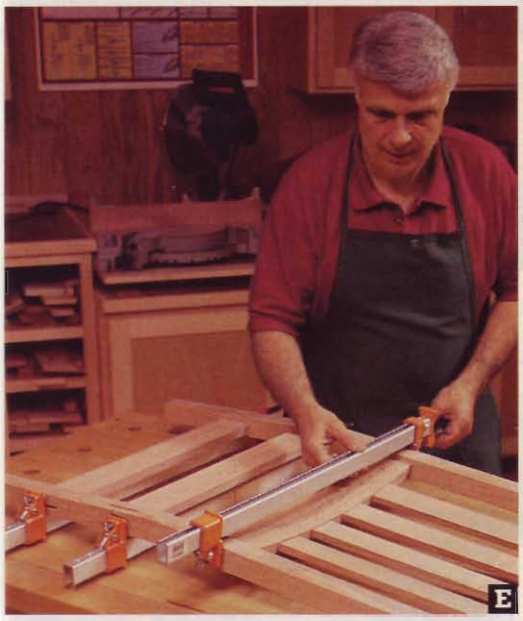
ing the rails' tapered rabbets. Reposition the fence, and complete the rabbets. The rabbets taper from 15/16" wide at the front to zero at the rear.

10 Plane material to ½" thick for the slats (G), plus an extra piece to test the tenon cuts. Cut the slats to the size listed. With a dado blade in your tablesaw, cut a tenon on your scrap, as dimensioned on **Drawing 2c**. Test its fit in the backrest rail (E) mortises. Make any necessary adjustments, and cut tenons on both ends of the slats.





2b RIGHT SIDE RAIL



Glue and clamp the backrest assembly, rear rails, and rear legs. Lay this chair back assembly on a flat surface until the glue dries.

Assemble the chair

1 Glue and clamp the front rails (C) between the front legs (A), and the slats (G) between the backrest rails (E). Make certain both of these assemblies are square and flat.

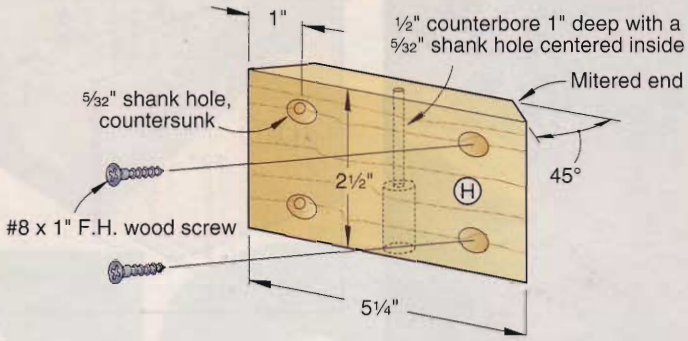
2 Glue and clamp the rear rails (D) and the backrest assembly (E/G) between the rear legs (B), as shown in **Photo E**.

3 Join the front assembly (A/C) and the back assembly (B/D/E/G) by gluing and clamping the side rails (F) in place, where shown on **Drawing 2**. Make certain the front legs are parallel to the straight lower portion of the rear legs. Measure diagonally between front and rear legs to check for square. Rest the assembly on a flat surface to dry.

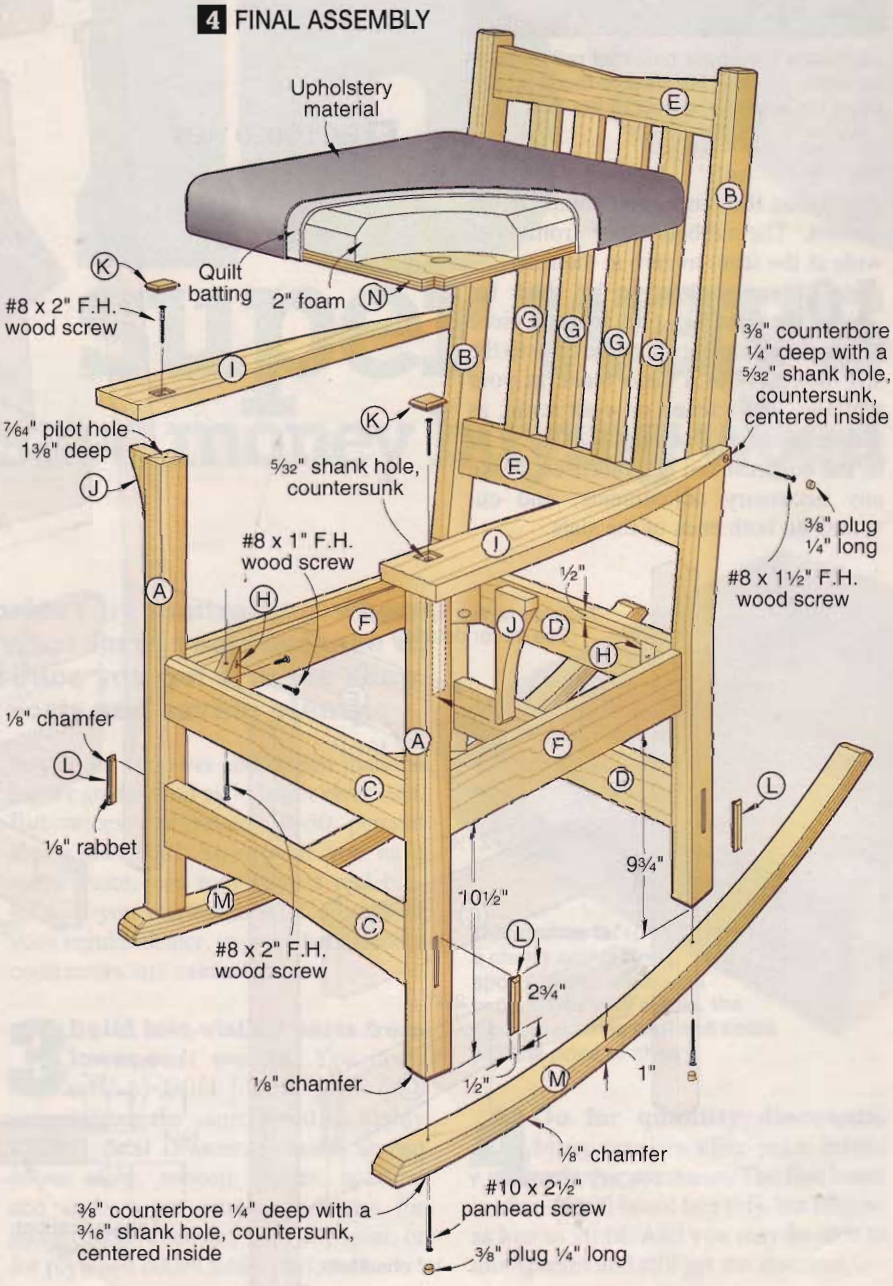
4 Cut the corner braces (H) to the size listed. Miter the ends, where shown on **Drawing 3**. With the faces of the miters held flat on your drill-press table, drill the countersunk 5/32" holes. Turn the parts on edge, and drill the counterbored 5/32" shank holes, centered on the parts' length and thickness.

5 Glue and clamp the corner braces in place, aligning their bottom edges with the rails' bottom edges, where shown on **Drawing 4**. Using the countersunk shank holes in the braces as guides, drill pilot holes in the rails, and drive in the screws.

3 CORNER BRACE

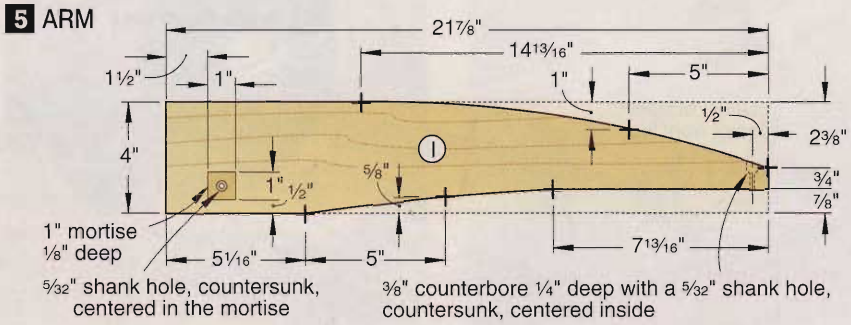


4 FINAL ASSEMBLY

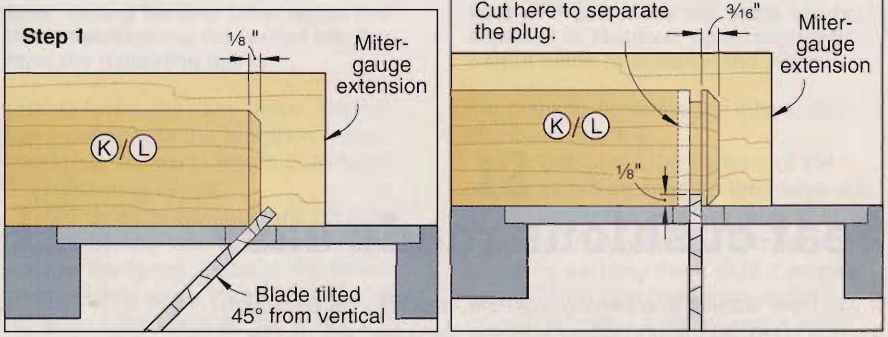


Align the chair arm perpendicular to the front leg with a framing square. Using the counterbored shank hole as a guide, drill a pilot hole into the rear leg, and drive in the screw.

5 ARM



6 CUTTING THE MORTISE PLUGS



Add arms, corbels, and mortise plugs

1 Cut two ¾×4×21⅞" blanks for the arms (I). Referring to **Drawing 5**, lay out the arms' shape and 1"-square mortise. To lay out the curves, mark the three points shown for each one. Bend a ⅛"-thick strip of wood to connect the points, and then draw the curve. Make sure you have mirror-image parts. Bandsaw and sand the arms to shape. Chuck a ⅜" plug cutter in your drill press, and cut two ⅜"-long plugs from the *edge* of one of the waste pieces. You'll use these later to plug the counterbores for the screws that attach the arms to the rear legs.

2 Outline the mortises with a chisel. Chuck a ¼" straight bit in your handheld router, and rout the ⅛"-deep mortises close to the outlines. Finish the mortises with your chisel.

3 Drill 5⁄32" countersunk holes, centered in the mortises. Drill ⅜" counterbores with centered 5⁄32" countersunk holes in the arms' edges, where shown on **Drawing 5**.

4 Draw the diagonals on the top ends of the front legs (A) to find their centers, and drill 7⁄64" pilot holes 1⅜" deep, where shown on **Drawing 4**. Position the arms (I), centering the shank holes in the arm mortises on the leg pilot holes. Drive in the screws. Align the arms, as shown in **Photo F**, and screw them to the rear legs (B). Retrieve the two ⅜" plugs cut previously, glue them into the counterbores, and sand them flush.

5 Cut blanks for the corbels (J) to the size listed. Make two copies of the corbel on the pattern insert, and adhere them to the blanks with spray adhesive. Bandsaw and sand them to shape. Glue and clamp the corbels in place, centered on the outside face of the front legs, where shown on **Drawing 4**.

6 Cut a 1¼×1¼×6" blank for the arm mortise plugs (K) and two ½×2¾×6" blanks for the leg mortise plugs (L). Tilt your tablesaw blade to 45°. Attach an auxiliary extension and a stopblock to the miter gauge, and chamfer all four edges of both ends of the three mortise plug blanks, where shown in **Step 1** of **Drawing 6.** Switch to a ⅛" dado blade, and cut dadoes all around each blank, where shown in **Step 2**.

7 To separate the mortise plugs from the blanks, fit your tablesaw with a zero-clearance throat plate. Cut the blanks where indicated in **Step 2** of **Drawing 6**.

8 Glue and clamp the mortise plugs in place, where shown on **Drawing 4**. Align the grain of the arm mortise plugs (K) with that of the front legs (A).

Note: If you are building the armchair, skip to the section on applying the finish, then continue with the instructions for making the seat.

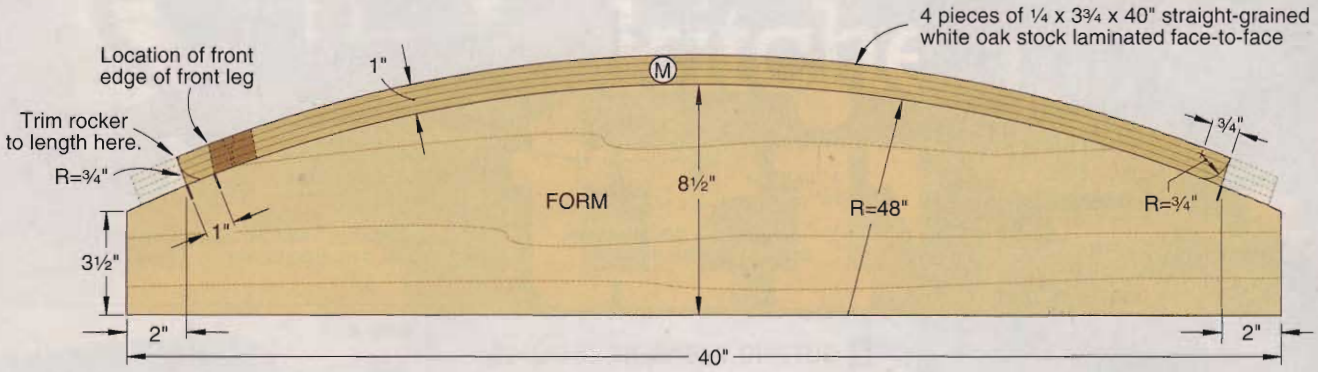
Laminate and mount a pair of rockers

1 From straight-grained, knot-free stock, resaw and plane four ¼×3¾×40" strips for the laminated rocker blank, plus one additional strip to use as a clamping platen. Cut five ¾×8½×40" pieces of particleboard for the rocker form. See the article "Lessons in Bent Lamination" on *page 78* for instructions on building the form and making the rockers.

2 With the rockers (M) formed, mark their overall length and the location of the front edge of the front leg on the form, where shown on **Drawing 7**. Match up the rockers as they were in the single bent lamination, and mark their front ends. Clamp each rocker, in turn, to the form, centered end to end with the marked end at the front. Transfer the marks from the form to the rocker. Draw the ¾" radii where shown. Bandsaw and sand the rocker to finished shape.

3 Lay the chair on its side. Mark the leg lengths, where shown on **Drawing 4.** Align the top edge of a rock-

7 ROCKER FORM

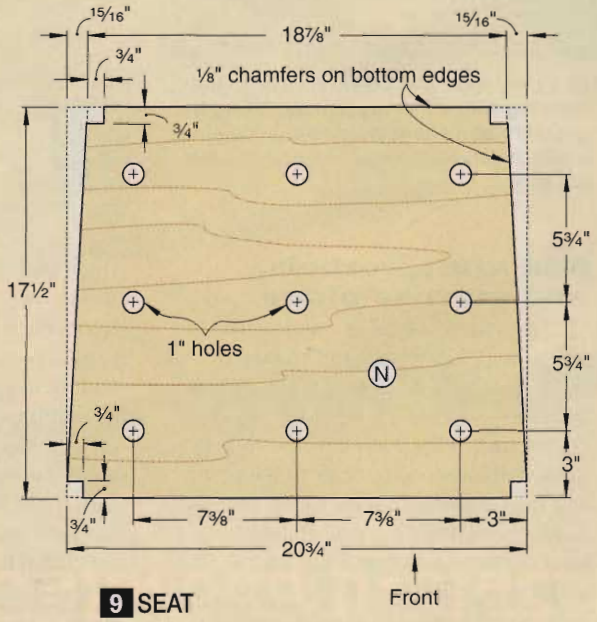


Seat cushions made easy

If you have access to a sewing machine, making your own cushion is a snap. All the upholstery supplies you need are readily available at local fabric stores.

Purchase a 2×24×24" piece of urethane foam, and enough polyester quilt batting to make four 26×29" pieces. Select a 30×30" piece of upholstery material. (We chose a black imitation leather.) Buy a spool of upholstery thread to match the color of your material.

Cut a ½×17½×20¾" piece of plywood for the seat (N). Lay out the shape and the locations of the vent holes, where shown on **Drawing 9**. Drill the holes with a 1" Forstner bit, and cut the seat to shape. To keep the upholstery material from wearing on its sharp edges, rout a ⅛" chamfer on the seat's bottom edges. Now, to add the cushion, just follow the six steps shown in the photos *below*.



9 SEAT

Adhere the oversize piece of foam to the seat with spray adhesive. Guided by the seat's edges, trim off the excess foam with an electric carving knife or serrated bread knife. Be sure to keep the blade perpendicular to the seat.

For the cushion to have smooth rounded edges, the foam's square top edges must be removed. To do this, first mark cutlines 1" in and 1" down from the foam's top edges with a straightedge and felt-tipped marker.

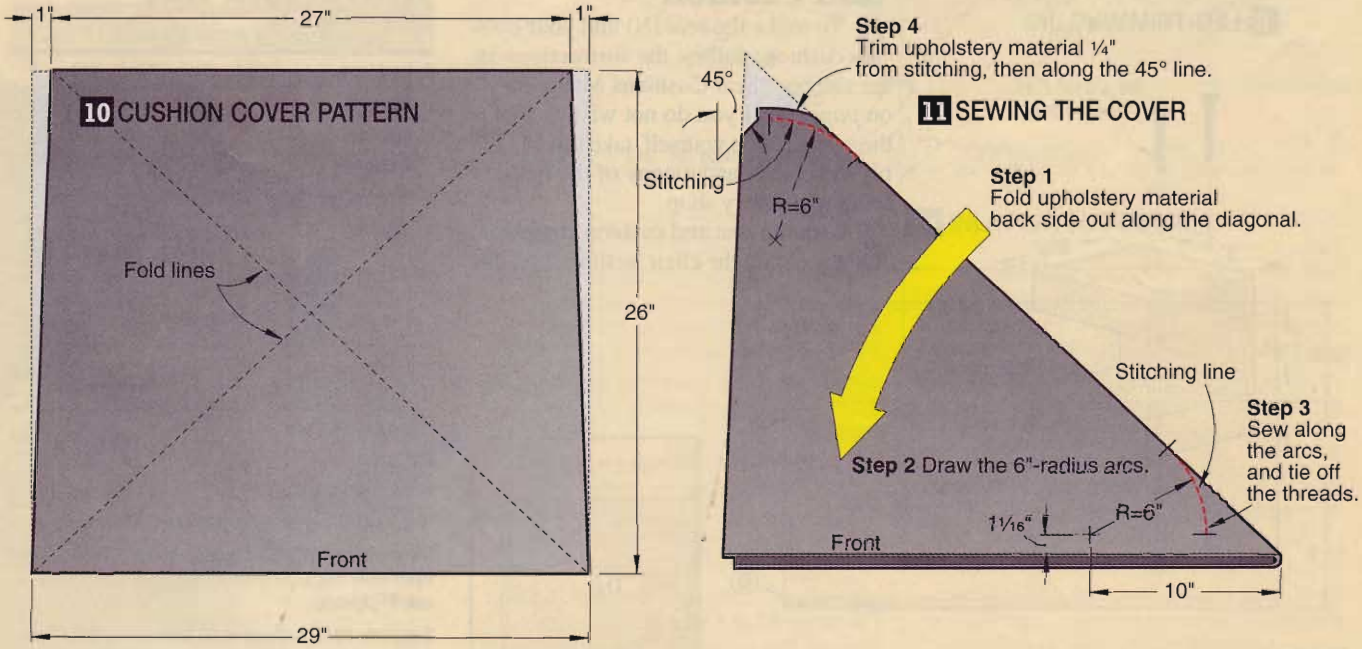
Once again using the electric knife or serrated bread knife, cut along the marked lines. Keep the knife's blade aligned with the lines marked on both the top and side to form 45° bevels on the foam's top edges.

er with these marks, clamp it in place, and trace the top edge of the rocker onto the legs with a pencil. Repeat on the chair's other side.

4 Make the leg-trimming jig, shown on **Drawing 8** on *page 76*. Clamp the jig to the first leg, aligning its edge with the marked line. Trim the leg to length, as shown in **Photo G**. With the jig still in place, smooth the leg's end with a sanding block. Repeat on the other three legs.

5 Sand ⅛" chamfers on the ends of the legs with a sanding block. With the chamfer bit in your table-mounted

With the leg-trimming jig clamped in place, guide your saw by pressing its blade against the jig as you crosscut the rocker leg bottom ends to length.



Layer four 26×29" pieces of quilt batting on your workbench. Center the seat and attached cushion on the batting; now pull the batting up over the foam, and fasten it to the seat with ⅜" staples. Trim the excess batting at the corners.

Cut your upholstery material where shown on Drawing 10. Following the four steps on Drawing 11, lay out, sew, and trim two cover corners. Fold the cover on the other diagonal and repeat to form the other two corners.

Place the cover back side up, and center the cushion on it. Secure the cover to the seat at the middle of each side with one ⅜" staple. Now, working from centers to corners, pull the cover onto the seat and finish stapling it in place.

router, rout ⅛" chamfers on the bottom edges of the rockers, where shown on **Drawing 4**.

6 Clamp the rockers in place, and drill ⅜" counterbores ¼" deep in their bottom faces, centered on the legs. Drill pilot and countersunk shank holes, centered in the counterbores, through the rockers into the legs. Drive in the screws. Make four more ⅜"-long plugs. Glue the plugs into the counterbores, and sand them smooth.

On to the finish

1 Sand all the surfaces to 220 grit. Ease the unchamfered edges with a sanding block. Remove the sanding dust.

2 Apply stain or dye, and topcoat with a clear finish. (We used TransTint Golden Brown no. 6002 aniline dye to bring out the wood's quartersawn figure and topcoated with aerosol shellac. For more information on this finishing process, see the article "Make Quartersawn Figure Pop" on *page 22*.)

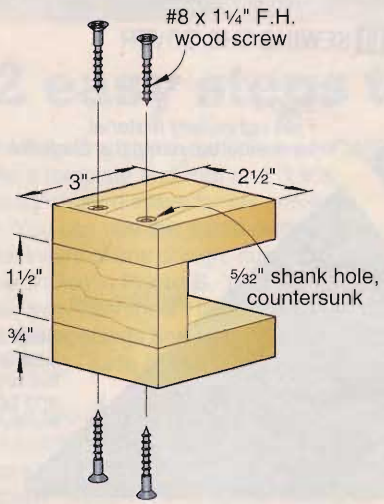
Fashion a seat and cushion

1 To make the seat (N) and your own cushion, follow the instructions in the sidebar "Seat Cushions Made Easy" on *page 74*. If you do not wish to make the seat cushion yourself, take the rocker, plywood seat, and a copy of the sidebar to an upholstery shop.

2 With the seat and cushion complete, place it on the chair, resting it on the rabbets in the side rails (F) and the corner braces (H). Using the counterbored holes in the corner braces as guides, drill pilot holes into the seat (N). Fasten the seat to the braces with screws, where shown on **Drawing 4**.

Written by **Jan Svec** with **Chuck Hedlund**
Project design: **Kevin Boyle**
Illustrations: **Roxanne LeMoine**; **Lorna Johnson**
Photographs: **Marty Baldwin**

8 LEG-TRIMMING JIG



materials list

Part	FINISHED SIZE T	W	L	Matl.	Qty.
A front legs	1½"	1½"	25¾"	WO	2
B rear legs	1½"	5¼"	45 13/16"	WO	2
C front rails	¾"	3"	21½"	QWO	2
D rear rails	¾"	3"	19¾"	QWO	2
E* backrest rails	1½"	3"	19¾"	QWO	2
F side rails	1¾"	3"	18 3/16"	QWO	2
G slats	½"	2"	19½"	QWO	4
H corner braces	¾"	2½"	5¼"	QWO	4
I arms	¾"	4"	21⅞"	QWO	2
J corbels	¾"	2"	6"	QWO	2
K* arm mortise plugs	1¼"	1¼"	5/16"	QWO	2
L* leg mortise plugs	½"	2¾"	5/16"	QWO	4
M* rockers	1"	1⅝"	37¾"	LQWO	2
N seat	½"	17½"	20¾"	P	1

*Parts initially cut oversize. See the instructions.

Materials key: WO–plainsawn white oak, QWO–quartersawn white oak, LQWO–laminated quartersawn white oak, P–plywood.

Supplies: #8x1" flathead wood screws (16), 8x1¼" flathead wood screws for leg-trimming jig (4), #8x1½" flathead wood screws (2), #8x2" flathead wood screws (6), #10x2½" panhead screws (4), ¾" particleboard for rocker form, spray adhesive, cushion foam, polyester quilt batting, upholstery fabric, upholstery thread, ⅜" staples.

Bits and blades: ¼" and 1" Forstner bits; 45° chamfer and ¼" straight router bits; stack dado set, ⅜" plug cutter.

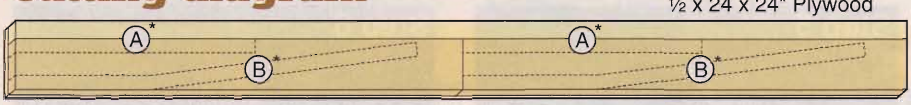
Tools to make the cushion: Electric knife or serrated bread knife, sewing machine, staple gun.

Buying Guide

Lumber kit. Quartersawn and plainsawn white oak planed to the proper thicknesses and slightly larger in length and width than the sizes listed, plus ½" plywood for the seat. Some parts may be color and grain matched and edgejoined. Order rocking chair kit no. W146A, $279.95 ppd., or armchair kit no. W146B, $239.95 ppd. Call Heritage Building Specialties, 800/524-4184, or visit them online at http://heritage.woodmall.com.

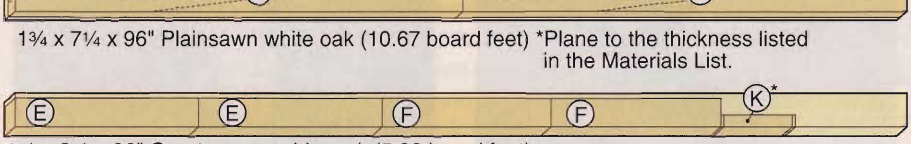
Aniline dye. TransTint Golden Brown water-soluble aniline dye, catalog no. 128482, $16.99 for a 2-ounce bottle. Check your local Woodcraft store, call 800/225-1153, or go to www.woodcraft.com.

cutting diagram

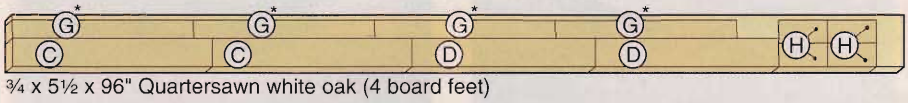


½ x 24 x 24" Plywood

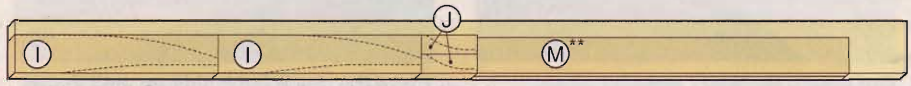
1¾ x 7¼ x 96" Plainsawn white oak (10.67 board feet) *Plane to the thickness listed in the Materials List.



1¾ x 3½ x 96" Quartersawn white oak (5.33 board feet)



¾ x 5½ x 96" Quartersawn white oak (4 board feet)



¾ x 5½ x 96" Quartersawn white oak (4 board feet)

¾ x 5½ x 96" Quartersawn white oak (4 board feet) **Resaw then plane to ¼" thick.

lessons in bent lamination

Create curved project parts the easy way with strips of wood, glue, and a form.

We all know that curves are pleasing to the eye. The question for woodworkers is: What's the best way to make them? In some cases, you can cut an arching shape from a solid piece of stock, or you can build up a blank with mitered pieces, and then cut it into a curve. But more often it's best to bend wood to get the shape you want. Why? Because bending usually produces a stronger, better-looking result, and wastes much less wood.

For our main example here, we'll use the rockers that fit the chair on *page 68*, showing you the best way to take wood around the bend.

Gather your materials

Consider wood species, thickness, and width as you plan your lamination. We used quartersawn white oak for our rockers; see "The straight skinny on bending" at the end of this article for a general guide to the bending properties of white oak and several other commonly used woods. If you plan to use a wood not listed in the chart, try this test. First, cut a sample strip to width and thickness. Then, bandsaw a particleboard form to the needed radius, and bend the sample strip around it.

To make the gentle curve required for rockers, we resawed a board into strips ¼" thick and 3¾" wide. Those dimensions worked great, but a sharper bend would have called for thinner stock, and greater width could have created problems in the form of surface cracks or complete breaks.

Within any species, some boards are better bending candidates than others. Reject any board with knots or wavy grain. Select boards with straight grain on the edges *and* faces. In **Photo A**, you see two very different ash samples.

We recommend standard yellow glue for lamination bending. The "Extend" versions of Franklin's Titebond glues give you more time to assemble your lamination and adjust the clamps. For outdoor projects, use water-resistant Type II yellow glue or polyurethane. (See "Do you need a heavy-duty adhesive?" on *the next page* for information about other choices.)

Particleboard works well for making your bending forms. It's easily shaped and inexpensive. You also can choose plywood. Finally, be sure to have plenty of clamps on hand. Sliding bar clamps are the most convenient choice for the job, and provide adequate clamping pressure.

Build your form

To end up with a perfect curve, start with a perfect form. Use a plan pattern, trace an existing piece, or use a trammel to make a radius. We laid out our rockers with a 48" trammel, a pencil, and a piece of particleboard.

Cut the sheet stock just larger than the shape you've drawn. Now, cut more pieces to the same dimensions, until you have enough to laminate a form that's approximately equal in thickness to the width of your bending stock. Use your bandsaw to cut about ⅛" outside of the line you marked on the first piece, then sand to the line. Use this template to mark the rest of the pieces, and bandsaw them ⅛" outside of their lines.

Now, use yellow glue and screws to begin building the form. Add one piece at a time, and trim each piece to match the previous one with a flush-trim bit in your router, as shown in **Photo B**.

After completing the form, apply packaging tape to the bending surface, as shown in **Photo C**. The tape will keep your glued-up lamination from sticking to the form.

Cut the laminations

Slice thin strips of wood from standard lumber, using either the tablesaw or the bandsaw. (The chart at *the end of this article* gives you thickness recommendations.) Thinner strips produce a bend that holds its shape better. Thicker strips tend to spring back somewhat after you remove the clamps, slightly flattening the curve. We got a springback of about ⅜" on our chair rockers, as measured at the center of the arch. Make your laminate strips ¼" wider than the completed piece, so you can trim away any roughness after the glue-up dries. Also make them 2" longer than the completed piece to allow for accurate trimming to final length.

A well-tuned bandsaw can handle most resawing tasks. However, if you need lamination strips less than 6" in width, you might find it easier to cut them on the tablesaw, using a 24-tooth

A

B

C

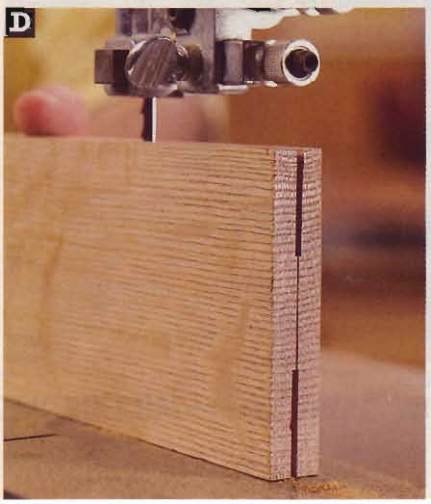
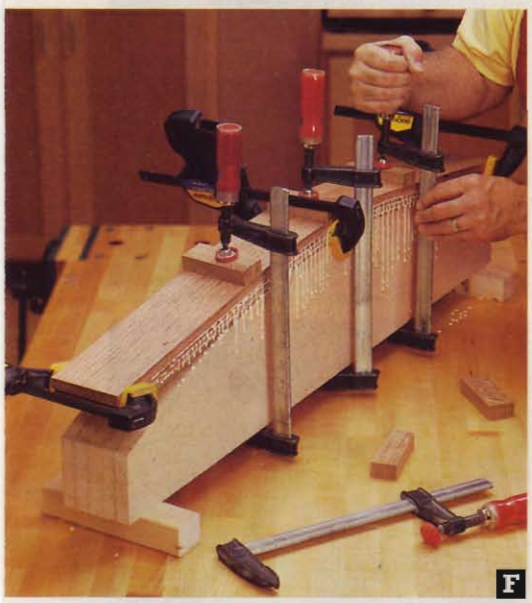

D

PHOTO A:
Look for bending stock with straight grain, like that on the right. When grain runs in various directions, as on the left, it's quite likely to break.

PHOTO B:
Particleboard serves well as material for bending forms because it's inexpensive, easily milled, and free of voids. Use enough sheets to equal or exceed the width of your laminate strips.

PHOTO C:
Any kind of tape will keep glue off your forms; this clear packaging tape is wide and easy to remove when you're done.

PHOTO D:
Before resawing wide stock with a bandsaw, try cutting a kerf on both edges with the tablesaw. The bandsaw blade will tend to follow the kerfs.



rip blade. For most of us, the tablesaw produces smoother, straighter surfaces than the bandsaw, although it wastes more stock by cutting a wider kerf.

See **Photo D** for another good resawing option. Run the original workpiece across your jointer after each cut so you always have one perfectly smooth surface. Scrape, plane, or sand the other surfaces smooth. Cut one extra strip to serve as a clamping surface.

Test a sample strip on your form before you cut the whole stack. You should be able to bend it to its finished shape with moderate hand pressure. When you apply glue, the wood will soak up moisture, and become even more pliable.

Ready, set, glue

Make a dry run before you open the glue bottle. First, put your form in a position that will allow convenient clamping. If your clamps will sit vertically, as in our example, you may need to set the form on supports to make room for the clamp jaws. (Our clamping blocks took care of the problem, as you'll see shortly.) Place the stack of strips on the form, then add as many clamps as it takes to close all gaps, with a scrap of wood under each clamp head to protect the workpiece and spread the clamping force.

Vacuum or wipe the dust from the laminate strips, and prepare to work quickly. Apply glue to both sides of each laminate joint, building the stack as you go. (Don't apply glue to the outside surfaces of the first and last pieces,

PHOTO E:
With wide, fixed jaw faces, Quick-Grip clamps do a good job of holding the strips in alignment. Place your first bending clamp right in the middle.

PHOTO F:
Place a block under each clamp to spread the force. Screw a block on the bottom of the form at each end to keep the final clamps from sliding.

PHOTO G:
Use two clamps at each end, where the bending distance and resistance are greatest. Tighten one clamp, slide the other down, tighten, and repeat.

It's difficult to get good results from a single form when you build a piece with multiple curves. In those situations, press the lamination strips between two or more mating forms.

Here's the key to making mating forms: Remember that they won't match up correctly if you simply bandsaw them apart, then place several lamination strips in between. When you cut your form stock into

Do you need a heavy-

Some experts recommend using plastic resin glue, modified urea formaldehyde glue, or epoxy for lamination bending, point-in [illegible] hard, [illegible] glue [illegible] opt [illegible] because it [illegible] convenient to [illegible] nd, in our [illegible] "creep" [illegible] never has [illegible] ted a [illegible]

Delta 23-710, $160 www.deltamachinery.com, 800/438-2486

High points

- This is the only tested machine that allows you to grind across the top of the high-speed wheel (see **Photo E**) to eliminate hollow grinding.
- The sliding tool holder helps you sharpen flat tools, such as plane irons and wood chisels, but also has a protractor-style indexer for lathe tools and carving tools that must be held at angles other than 90° to the wheel.
- Price includes a dressing stone to true the surfaces of the wheels as they wear.

Low points

- The high-speed wheel runs constantly when the machine is turned on, creating vibration and unnecessary noise.
- The wastewater reservoir is shallow, so water begins dripping from the drain tube shortly after you begin sharpening on the wet wheel.

More points

- Accessory knife-grinding attachment (model 23-715, $65) required to sharpen planer and jointer knives, but it works well on both wheels.
- For the same price as the Delta 23-700, this machine is far superior.

The Delta 23-710's tool rest can be moved to the dry wheel for more aggressive grinding.

Glendo Corp., GRS Power Hone, $310 www.grstools.com, 800/835-3519

High points

- The 600-grit diamond wheel proved aggressive for fast material removal and fine enough for honing. It worked well for flattening of tool backs, too, where there's a lot of metal to be removed.
- No tools required to change wheels.
- The optional ceramic honing disc ($100) and .5-micron diamond spray ($24) create a fast and unequaled mirror finish on the cutting edge.

Low points

- It's expensive—$310 for the basic unit, which consists solely of a motorized diamond wheel.
- Although the manufacturer recommends using water on the wheel while grinding and honing, no drip tank, wastewater reservoir, or splash guard is provided. (We wrung water from a damp cloth onto the wheel when it began to get dry.)
- You'll have to hand-hold tools while sharpening, as no tool rest for woodworking tools is currently available. However, Glendo's Chris Gorton told us they are developing a tool-holding accessory for turning and carving tools.

More points

- Operating instructions are scant, but an instructional videotape ($49) is available.
- In spite of its shortcomings, our tester achieved excellent results sharpening wood chisels and plane irons—handheld—using this machine.

Three steps to sharper tools

To put the best edge on your cutting tools follow three basic steps:

1 Grind. Just as you use coarse sandpaper when you start smoothing a rough workpiece, use a coarse wheel (200 grit or lower) to quickly reshape the cutting edge to prepare it for sharpening. Grind a cutter when you find large nicks in it or if an edge gets rounded from repeated honing. Grind until you remove all traces of the old bevel, but don't let the edge turn blue from overheating—especially near the finish of your grind because the edge is very thin at the tip.

2 Hone. This step removes grinding grooves, or smooths a dull or slightly nicked cutting edge. Unless you're sharpening lathe tools, always hone after grinding. You also can hone any time you nick a cutting edge or if your tool isn't cutting cleanly.

Here's a test: Carefully cut a small sliver across the end grain of a piece of soft wood. If the tool tears the wood instead of cutting it cleanly, it's time to hone. (This is also a good way to test your honing job when you've finished.)

Hone the beveled edge on a finer-grit stone (600 grit or higher) until you can feel a small ridge, or *burr*, on the back of the blade, then turn the blade over and hone the back. Flattening the back (as shown in the photo at *right*) is the most important, yet most often overlooked step in sharpening. Continue honing opposite sides of the tool until the burr disappears.

3 Polish/Buff. To get the sharpest and longest-lasting edge, polish after honing. To do this, apply a thin layer of metal polishing compound (any kind of brass or chrome metal polish works fine) to a piece of scrap leather glued to a flat board. With the cutting bevel face down on the leather, apply light pressure and pull it toward you without rocking the tool. Repeat until the cutting edge has a mirror shine, and you're finished. Polish only the bevel with the leather and compound. The flat backs of plane irons and chisels should only be polished on fine stones (1,000-grit or higher), as leather might round the backs.

Always flatten the back side of a tool after honing its beveled edge.

Makita 9820-2, $260 www.makitatools.com, 800/462-5482

High points

- This sharpener uses a high-quality Japanese stone.
- Because of the large reservoir below the stone, you can sharpen for a long time before wastewater drips from the overflow tube.
- Planer/jointer knife holder comes as standard equipment with this sharpener.

Low points

- The tool rest's height-adjustment knobs are fine-threaded, as shown in **Photo F**.
- The drip tank friction-fits to the sharpener body a little too well. If you finish sharpening before you exhaust the water supply, you'll find it hard to remove without spilling.

More points

- The cast-iron tool rest holds the bevel-grinding angle rock solid, but you have to hand-hold chisels and plane irons at 90° to the wheel. (There's no indexed tool holder for narrow cutters.)
- This tool removes material too slowly for heavy grinding, but does a very nice job honing.

F

Independent height-adjustment knobs allow precise adjustment of the Makita tool rest, but fine threads and tight quarters make large changes inconvenient.

Tormek Super Grind 2005, $400 www.tormek.com, 800/586-7635

High Points

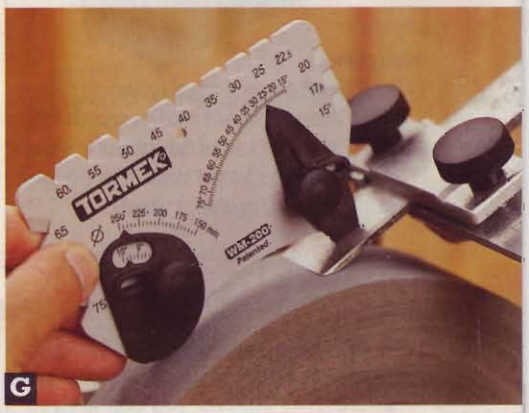
- Easily adjustable, F-shaped tool rest supports a variety of tool holders and mounts in either of two locations depending on whether you want the wheel to turn toward or away from the tool. (Toward the tool is more aggressive, so you'll use this orientation for grinding, the other for honing.)
- This sharpener comes with a nifty angle-setting gauge, shown in **Photo G**.
- Abrasive wheel can be regraded for aggressive grinding or fine sharpening (and back again) using an optional stone grader.
- Besides explaining how to use the tool, the outstanding 147-page manual also gives lots of good information on sharpening in general.
- Simple cleanup: Just remove the water tray and dump.

Low Points

- It's expensive at $400, and at that price it comes jigged for only flat, narrow (2" or less) blades. Most of this system's finest features, including the grading stone, are optional accessories costing $13–$145 apiece.
- The leather stropping wheel puts a mirror edge on tools, but the honing compound creates lots of dust. We applied mineral oil to the wheel frequently to control the dust.
- Sharpening jointer and planer knives gets messy. As you work it back and forth, the knife carries water from the wheel, then drips it on the bench.

More points

- If you can afford it, this is the system to own because, properly accessorized, it will put a sharp edge on virtually any cutter in your shop.



G

As the wheel wears, it gets smaller, changing the grinding angle. Tormek's Angle Master gauge compensates for wheel wear when setting the angle.

Woodtek 958-371, $90 www.woodworker.com, 800/645-9292

High points

- It's the least expensive model in the test.
- Removable wastewater tray is supplied so you don't have to provide a suitable receptacle.

Low points

- Stamped-steel tool rest deflects under pressure, and has no indexed tool holder for keeping tools 90° to the wheel. It also lacks the fine height adjustability of the similar Makita tool rest.
- Sparse manual gives only assembly instructions, with no tips for use.

More points

- Like the Makita, this sharpener removes material too slowly for heavy grinding, but does a very nice job honing—if you have a steady hand to hold the tools.

4 power-sharpening tips from our expert

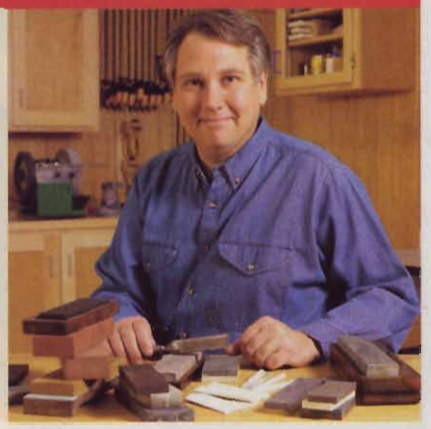
Our product tester, Steve Oswalt, has been sharpening woodworking tools for 30 years, and owns and uses a large collection of sharpening stones. Here are some things he's learned over the years.

1 Most chisels and plane irons come from the factory with a rough grind on the flat side. So, before grinding the bevel, hone the back of the tool on a flat stone until you can see yourself in the reflection. Now hone the bevel.

2 Sharpen at the first sign that the tool is beginning to dull. It's easier to maintain a sharp edge than it is to repair one that's extremely dull.

3 To get the best edge, keep the tool moving across the face of the stone. Not moving the tool leads to grooves and rounded edges on your tool and hollows the stone.

4 If you don't have a water-cooled sharpener, dip the tool in water as soon as it begins to feel warm to keep it from overheating, then go back to the wheel. If your tool turns blue, grind or hone away all of the blue. (Blue steel dulls quickly.)



A sharpener for every tool and budget

When used with all of its optional tool-holding jigs, the Tormek Super Grind 2005 delivered sharp, clean edges on every tool we could find in the shop, so it earns Top Tool honors. Those accessories can quickly increase the machine's $400 base price. But many retailers and mail-order houses offer money-saving package deals—such as the $600 "Cabinetmaker's Master Kit" we tested from Woodcraft (www.woodcraft.com, 800/225-1153, model no. 142900CAB) that comes with the jointer/planer blade jig, diamond stone dresser, stone grader, and a protective fabric cover for the sharpener.

Is that more than you want to spend? We named two sharpeners as Top Values: The Delta 23-710 and Woodtek 958-371. The Delta does a very good job grinding and honing chisels and plane irons as it comes from the factory; the accessory jointer/planer knife holder proved equally adept and still keeps your cost about $35 less than the Makita. If you don't want to sharpen jointer or planer knives, opt instead for the Woodtek. You can fashion your own tool-holding jigs, and keep your cost below $100.

PERFORMANCE GRADES FOR EIGHT CUTTING-EDGE SHARPENING SYSTEMS

			WET WHEEL					AUXILIARY WHEEL				PERFORMANCE REPORT CARD (3)							ACCESSORIES (4)						
BRAND	MODEL	MOTOR AMPERAGE	COMPOSITION (1)	GRIT	SPEED (RPM)	SIZE (THICKNESS X DIAMETER, INCHES)	COMPOSITION (1)	GRIT (2)	SPEED (RPM)	SIZED, (THICKNESS X DIAMETER, INCHES)	FINAL SHARPNESS	MATERIAL-REMOVAL RATE	TOOL REST QUALITY	VIBRATION	NEATNESS	POWER	INSTRUCTION MANUAL	STANDARD	OPTIONAL	WARRANTY (YEARS)	CORD LENGTH (FEET)	COUNTRY OF ASSEMBLY (5)	WEIGHT (POUNDS)	SELLING PRICE (6)
DELTA	23-700	2.0	A	220	70	2 x 10	A	100	3,450	5/8 x 5	C	A-	B	B	C	A	B	T		2	6	T	32	$160
	23-710	2.0	A	1,000	400	1 x 8	A	120	3,600	2 x 5	A-	A-	A	C	C	B	B+	SE, T	JP	2	6	T	42	160
GLENDO CORP.	GRS Power Hone	1.3	D	600	240	1/2 x 5	N/A	N/A	N/A	5/8 x 5	A	A-	N/A	A	D	C	D		CD, MA, QC, W, WB, WS	2	6	U	11	310
GRIZZLY	G1036	4.2	A	220	70	2 x 10	A	100	3,450	N/A	C	A	B	B	C	A	B	T	TU	1	6	T	36	130
MAKITA	9820-2	1.1	A	1000	560	1 x 8	N/A	N/A	N/A	N/A	A-	B	B	A	C	B	B	JP, T	SC, W	1	8	J	24	260
PENN STATE	#SSG-ACCU	4.2	A	220	60	2 x 10	A	100	3,450	5/8 x 5	C	A-	A	B	C	A	D	SE, T		2	6	T	35	165
TORMEK	Super Grind 2005	1.8	A	220-1,000	90	2 x 10	L	H	90	1 1/4 x 8 5/8	A-	A-	A	A	B	A	A	A, H, SE, T	AX, C, G, JP, K, PL, SC, SD, SG, SJ, SK, ST	3	6	S	35	400
WOODTEK	958-371	1.2	A	420	420	2 x 7	N/A	N/A	N/A	N/A	A-	B	D	A	B	B	C	T		1	6	T	13	90

NOTES:

1. (A) Aluminum oxide
   (D) Diamond
   (L) Leather
   (N/A) Not applicable
2. (H) 6,000-grit honing compound
3. A Excellent
   B Good
   C Average
   D Below average
   N/A Not applicable
4. (A) Angle-setting gauge
   (AX) Axe jig
   (C) Cover
   (CD) Ceramic stone with diamond spray
   (G) Gouge jig
   (H) Honing compound
   (JP) Jointer/planer knife holder
   (K) Knife jigs
   (MA) Multi-angle holding jigs for gravers
   (PL) Profiled leather honing wheel
   (QC) Quick wheel-change adapter
   (SC) Scissors jig
   (SD) Diamond stone dresser
   (SE) Straight-edge jig
   (SG) Stone grader
   (SJ) Scraper jig
   (SK) Skew-chisel jig
   (ST) Short-tool holder
   (T) Tool rest
   (TU) Upgraded tool rest
   (W) Additional wheel grits
   (WB) Wheel blank
   (WS) Wheel storage rack
5. (U) United States
   (S) Sweden
   (T) Taiwan
   (J) Japan
6. Prices current at time of article's production and do not include shipping, where applicable.

Talk about these tools in our Sharpeners forum at www.woodmagazine.com/woodmall/charts

Written by **Dave Campbell** with **Steve Oswalt** Photographs: **Marty Baldwin**

See how this Delaware woodworker crafts fine veneers and thin wood strips into elegant oval trays.

Ken Schubert's

bentwood beauties

Surrounded by veneer and forms, Ken Schubert pulls a piece of veneer for one of his trays. He often has an entire log sliced, then restacked in the order in which it was cut to get a lasting supply of great-looking wood at an economical price.

Ken Schubert didn't set out to become a career woodworker. As a materials scientist, he spent his days devising and studying high-tech materials in the laboratories at the University of Delaware. Woodworking simply provided Ken a hobby. Then a request from a family member changed everything.

Curly and birds-eye maple bring amazing luster to this 13×21" tray. Dark red accent stripes separate the veneers to add contrast.

A

To adhere the veneers to the plywood substrate, Ken Schubert first coats the veneer sheets with glue. Then, he sandwiches the veneer and substrate between two laminate-covered plywood platens to hold the veneers flat during the glue-up.

B

Ken relies on a homemade vacuum press to remove the air from the bag containing the tray bottom. Pressure from the pump holds the plywood platens tight against the veneer and substrate while the glue dries.

Unexpected events get business rolling

About a decade ago, Ken's niece attended Bryn Mawr College, in Bryn Mawr, Pennsylvania, where they held an old-fashioned hoop-rolling race every year for the senior girls. Not content to use a Hula-Hoop, she requested that Ken build a hoop from wood. He ripped 2"-thick stock into narrow strips, then laminated several layers together on a round form. For years thereafter, Ken made 40 to 80 hoops per year for women at the school.

Then, a series of circumstances put Ken's woodworking on a roll. First, he lost his job at the university. At about the same time, a neighbor and woodworking mentor passed away. Ken bought all his tools, and he picked up more equipment at a local manufacturer's surplus sale.

Ken now had a shop, and needed a way to make a living. "Since I knew how to make laminated hoops," Ken says, "I tried to find something which incorporated this knowledge. I settled on oval trays."

Each tray's most noticeable feature is the exquisitely veneered bottom panel. A 2"-wide rim, laminated from several thin layers of wood, surrounds the bottom panel and completes the design. Prices for the trays range from $135 to $155, depending on the tray's size, the costs of the woods used, and the complexity of the veneer design.

Using similar techniques, Ken also builds lazy Susans, and makes drum hoops for a professional drum builder and restorer. Here's a look at how Ken, with the help of his wife, Ellen, crafts these comely creations in their Wilmington, Delaware, basement shop.

Welcome to Ken's house of veneer

On the outside, Ken's house is brick. Inside, it's all about veneer. His treasure trove of beautiful pieces fills shelves throughout his shop. Like many of us, he can't resist a beautiful piece of wood. "I'll never use it all," he says. "Someday, I'll retire and take a bath on this."

Ken buys wood a bit differently than many woodworkers, though. Often, he buys veneer by the flitch: a whole log flat-sliced lengthwise into veneer, then restacked in the order the veneer sheets came from the tree. That allows him to book-match grain, or build a series of trays with matching bottoms.

Ken mostly uses domestic hardwoods, but occasionally dabbles in more-exotic tropical woods. Regardless of the wood species, it must have interesting grain, such as birds-eye, quilted, flame, crotch, or wavy patterns. There are veneers dyed deep black, as well, which Ken and Ellen use for accent stripes in the patterns.

Every tray starts from the bottom up

The tray begins not in Ken's hands, but with Ellen, a kindergarten teacher and an education instructor at an area college. (See "Piecing it together," on the *following page*, to see how she crafts the veneers into patterns.) "She makes whatever she feels like," Ken says. "She comes in, sits down, and says 'What am I going to make today?'" No matter what Ellen decides, chances are that Ken's impressive supply gives her plenty to choose from.

Before Ellen's veneer patterns arrive down in the shop, Ken cuts ¼" Baltic birch plywood sheets into oversize rectangles—roughly matching the veneer panels Ellen creates—to make tray bottoms. Each tray bottom receives veneer on both faces. The fancy, patterned veneer goes on the upper face, and a less-dramatic but still-beautiful veneer (usually a plainsawn version of the face veneer) goes on the underside.

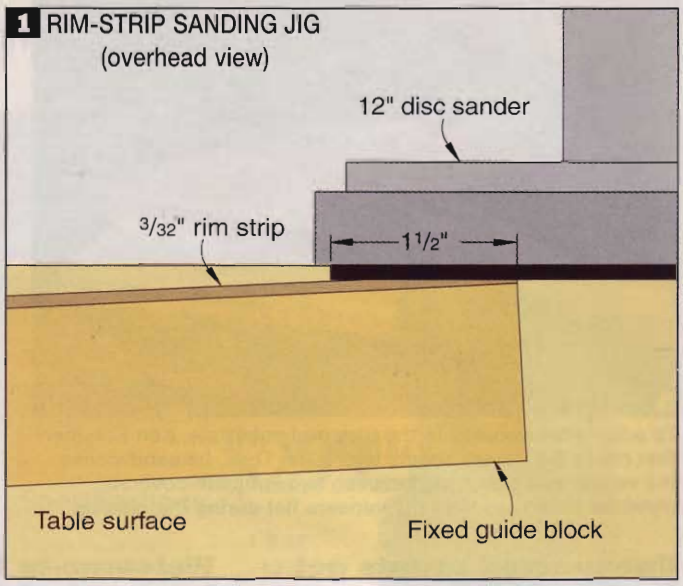
A low-pressure system at the heart of the shop

Ken brushes glue on the plywood substrate, and positions the veneers—with the taped side facing out—on either face of the plywood. Then he prepares the pieces for clamping, as shown in **Photo A**. But Ken isn't one to use ordinary clamps.

Off in one corner sits the heart and pride of Ken's shop: a vacuum veneer press he built himself. It's a series of vacuum pumps—all scrounged up used from surplus sales at local businesses and laboratories for a tiny fraction of their new cost. Those pumps are connected through a hand-fabricated tubing-and-manifold system to two large rubber bags, made by Ken from industrial rubber roofing. The device looks like a science experiment gone mischievously awry. But it *works*.

Ken stacks the substrate sandwiches into the bags (which rest on a large shelf), as shown in **Photo B**. He rolls the ends closed and secures them, then flips the switch on the largest of three vacuum pumps. In short order, it sucks the air out of both bags, putting 33 pounds per square inch of pressure on the assemblies inside. Ken then switches off the big pump and fires up two smaller ones (one for each bag) to maintain the pressure.

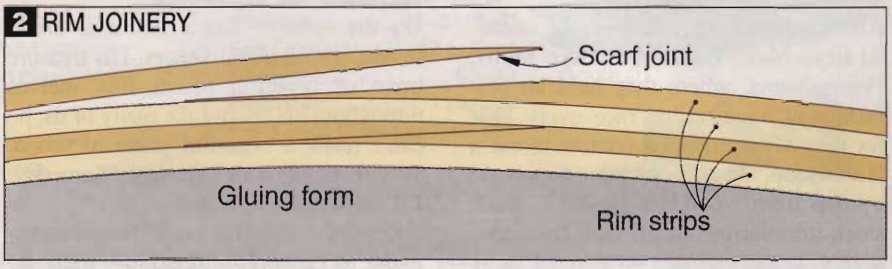
1 RIM-STRIP SANDING JIG
(overhead view)



This wooden fence meets a 12" sanding disc at a shallow angle, allowing Ken to sand bevels on both ends of each 3/32"-thick rim strip. He sands the opposite face at each end of the strip, which forms a scarf joint when the ends meet.

When a veneered bottom panel is ready—after three hours in the press and another day of drying—Ken sands off the veneer tape and smooths the surface using a random-orbit sander loaded with 150-grit abrasive. He sprays each side with two coats of a water-based finish (Ken prefers Aqua-Cote finishes by Cash Coatings, Inc.), sands to 220 grit, and applies five or six more coats of finish.

2 RIM JOINERY



Time to give the bottom an attractive rim

Ken's rims consist of bent laminations, built up from several layers of thin wood. Ken used to resaw thick stock to create the thin strips. But the process took time and wasted stock, so he now buys his 3/32"-thick strips precut.

Using a homemade jig, Ken sands a bevel on one end of an extra-long strip, as shown in **Photo C** and **Drawing 1**. Then he wraps the piece around a tray-

Piecing it together

Looking at Ellen Schubert's work area—the dining room table—you might not think she has all she needs to create her beautiful veneer patterns. She has no power tools or fancy jigs, and only a few basic measuring devices. But Ellen is well equipped because veneer cutting still relies more on traditional skills and a keen eye than on high-tech tools.

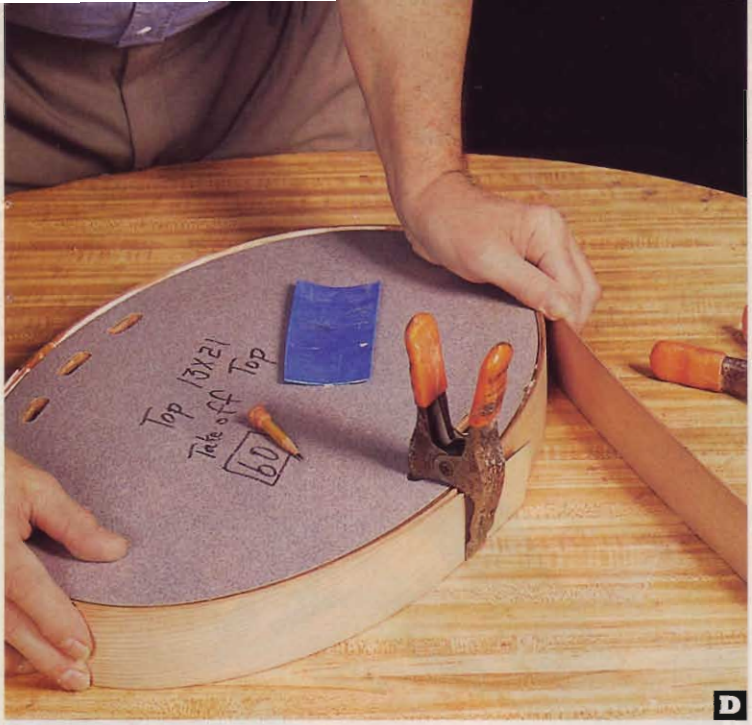
Her mainstay tool is a handheld veneer saw—the same type used for generations. Her work surface is a piece of medium-density fiberboard (MDF). A narrow MDF straightedge guides the saw.

Ellen begins by selecting veneer. She may just pull pieces that strike her fancy that day, or she may have a specific look or pattern in mind. If she wants to make a tray bottom that's book-matched (the grain in one half is a mirror reflection of the grain in the other) she selects two pieces sliced consecutively out of the same tree.

Ellen cuts each piece of veneer into manageable lengths with a pair of scissors. To straighten the contoured edge, she eyeballs it, lays down the straightedge, and pulls the veneer saw along the edge. She cuts through in two or three passes. The razor-sharp saw leaves a glue-ready edge.

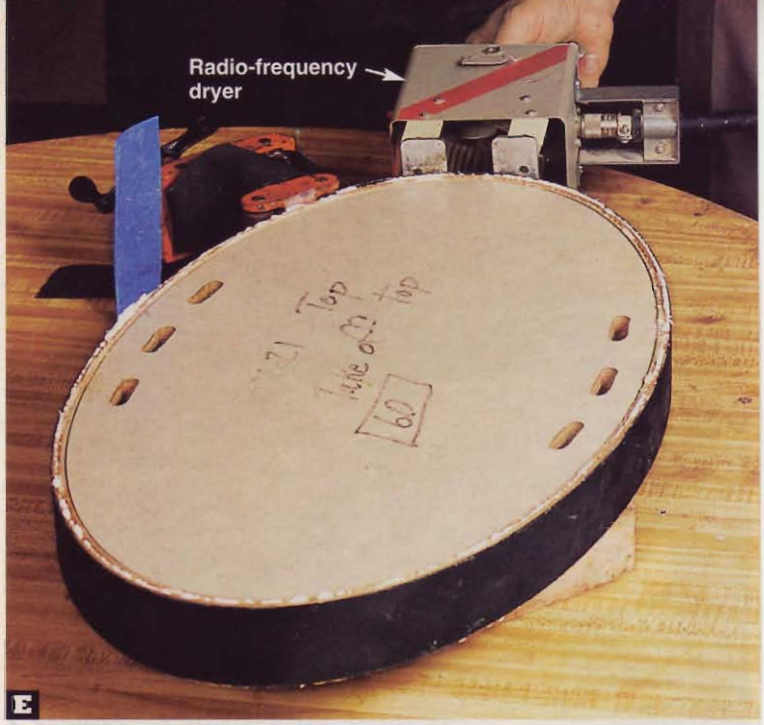
She assembles pieces on a metal plate, as shown in the photo, *right*. Veneer tape secures the seams. A few pieces go across the seam to hold the pieces in position; another runs along the seam to keep it tight. A simple pattern can go together in a matter of a few minutes. A more complicated pattern, like a sunburst, may take 30 to 45 minutes. Ellen leaves the assembled piece oversize and rectangular, and sends it downstairs to Ken's domain.

Working with just a straightedge, veneer saw, and J-roller, Ellen Schubert creates the pattern for a tray bottom. Magnets position the pieces on a metal backer while she tapes the seams.



D

A spring clamp holds the beveled end of the rim strip to the form while Ken wraps the strip around and marks its length. After this layer is glued and dried, he'll add another strip in the same way.



E

Ken glues one strip on the form and clamps it to the previous strip using a wide nylon band clamp. He speeds up the drying time by moving a radio-frequency gun across the surface.

shaped form. He marks where the strip begins overlapping itself, as shown in **Photo D**, and then cuts it and sands a bevel on that end. Without measuring, the two ends meet perfectly when they're back on the form, creating an almost-invisible scarf joint, shown in **Drawing 2**. He fits the subsequent three to five layers in the same way, placing the scarf joints on opposite sides of the rim.

Once he has two layers prepared, Ken spreads glue on their mating faces, wraps them around the form, and secures them with a band clamp. When he first started building trays, he'd glue on a strip, then wait hours for the glue to set up before he could add the next layer. With four to six layers, making the rims took a lot of time.

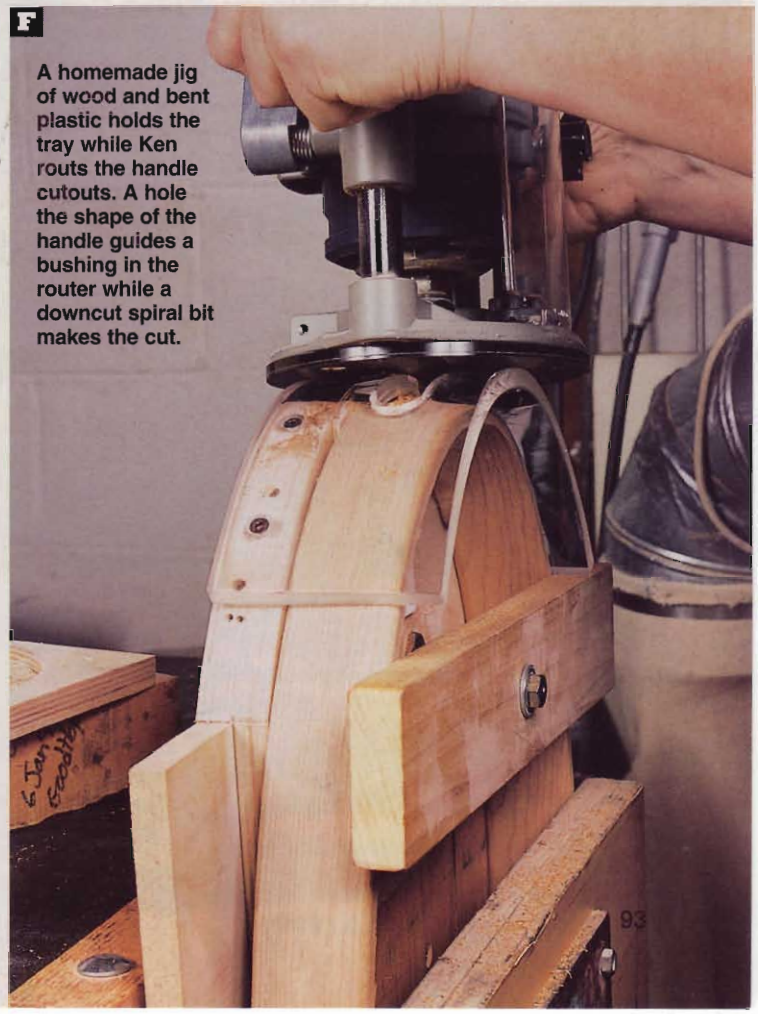
A trip to a woodworking machinery fair ended that, as Ken discovered radio-frequency drying. The process, usually employed only in commercial manufacturing, is less dramatic than it sounds: He uses an industrial white glue, and once the pieces are glued and clamped in place, he turns on a machine the size of an orange crate. A handheld "gun" connected to the machine shoots radio waves at the glue as he guides it around the form, as shown in **Photo E**. The radio waves heat the glue, curing it in about half an hour. Think of it as a handheld microwave oven, but without danger—the radio waves it emits are safe.

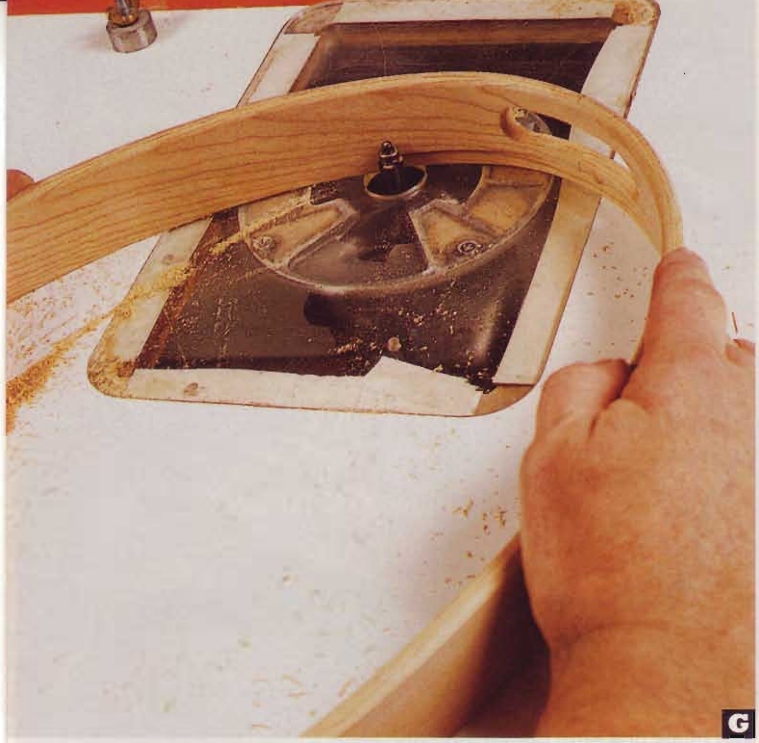
From here, the rim-building process is more conventional. He next cuts the top of the rim parallel to the bottom. A round-over bit shapes the top and lower outside edges. If there will be a handle, he routs it out using a jig he designed and built, as shown in **Photo F**.

The optional handles on this 13×21" cherry tray are bent laminations, as well.

F

A homemade jig of wood and bent plastic holds the tray while Ken routs the handle cutouts. A hole the shape of the handle guides a bushing in the router while a downcut spiral bit makes the cut.





A bearing-guided bit in a table-mounted router creates a shallow rabbet in the rim. The rabbet houses the veneered tray bottom and hides any gaps that may occur at the joint.

No matter how carefully he controls the process, no two bent laminations are exactly alike. Ken traces around the rabbet to lay out a bottom that fits perfectly.

Ken routs a shallow rabbet around the lower inside edge of the rim to receive the bottom panel, shown in **Photo G**. Then he sands and finishes the rim.

At last the tray bottoms, which have remained rectangular up to this point, meet the rims. Again there's no measuring; Ken just eyes the veneer seams to check they align with the handles and run straight the length of the intended rim. Next, he clamps a completed rim over the finished bottom and traces the outline of the rabbet cut earlier, as shown in **Photo H**. He cuts the bottom just outside the line, and then sands to get the final fit.

When the fit is right, Ken secures the bottom to the rim using the thinnest grade of Hot Shot cyanoacrylate (instant) glue. Ken signs the bottom and covers everything with a final coat of finish. Next step, the marketplace.

Marketing his wares takes Ken and Ellen on the road for a busy schedule of art festivals and craft shows during the summer months. It's a nomadic time of year, and just part of a life quite different than Ken's days in the lab. He misses those old days, sometimes, but given the choice, Ken would rather be in a basement stacked full with veneer, dust, and machines, listening to his vacuum pumps and juggling the summer schedule.

Written by **David Stone**
Illustrations: **Roxanne LeMoine**
Photographs: **Donna H. Chiarelli**

Book-matched flame walnut provides a dramatic appearance on this lazy Susan.

SHOP TIPS

Ken Schubert's Top 3 Tips for Woodworking Success

1. If you need a jig, build it. Don't be afraid to get it wrong, and don't be afraid to rebuild it better. And think about using materials you don't normally work with, such as the acrylic plastic Ken used on his handle-cutting jig. Consider using familiar materials and tools in different ways. Put an oversized bearing on a standard router bit to create a different profile, for example. Design jigs so they can be set up quickly.

2. Use the right glue. Ken uses two glues in his trays. The rims are held together with an industrial white glue that dries quickly when exposed to radio waves. The manufacturer says the same glue works without the radio-frequency dryer so Ken veneers with it, too. If the glue caused any trouble securing the precious veneers, though, he'd change to yellow glue in a heartbeat. Ken secures the tray bottom to the rim using cyanoacrylate glue because it dries quickly and is clear.

3. Don't measure unless you have to. When he first started, Ken tried to find the length of each lamination by measuring. It seldom worked. When he switched to simply wrapping a long strip around the form and marking where the ends overlapped, he seldom got a piece the wrong size. Ken extends the principle throughout his work. He traces the rim to fit the bottom, uses patterns when he can, and centers the handles by eye. While he believes "measure twice, cut once" is good advice, Ken prefers to arrive at the right size without measuring at all.

mr. wiggles... he's one swinging dragon

Kids will love tugging on this 3'-long dragon, thanks to his flexible center core of canvas. That pliability gives Mr. Wiggles a mind of his own as his head and tail swing to and fro in a random fashion.

For the items needed to build this project, see the Cutting Diagram, Materials List, and Buying Guide on *page 99*.

First, cut the body parts

1 Crosscut a ¾×9¼" board 10' long to form nine 12"-long blanks. Set aside the leftover piece for use later.

2 Referring to the Cutting Diagram and **Drawing 1a**, tilt your tablesaw blade, and bevel-rip the head blanks (A), tail blanks (B), midsection blanks (C), and neck and tail blanks (D) to the widths listed in the Materials List. Note that parts A and B need a bevel on one edge only; parts C and D require a bevel on both edges. Pencil the part letter on each piece after cutting it to aid in laying out the dragon later.

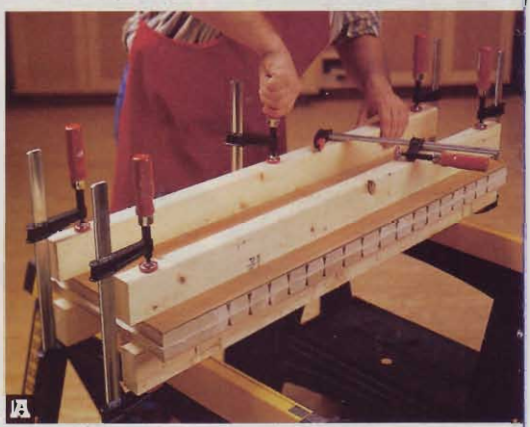
3 Cut two pieces of ¼" plywood to 12×37¼" to form top and bottom carriers. Apply double-faced tape to the bottom carrier, where shown on **Drawing 1**. Remove the tape backing.

4 Starting with a head blank (A), place the first layer of parts facedown on the bottom carrier in the order shown. Position the parts firmly against each other and square with one long edge of the plywood. Designate this the bottom edge.

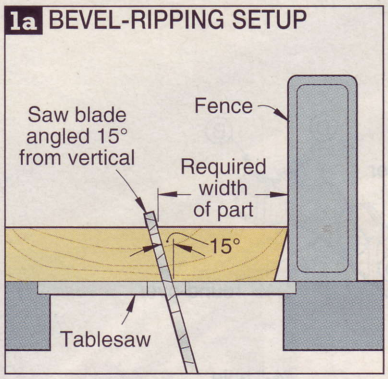
5 To ensure perfect alignment of all of the parts, position the second layer of parts faceup on the first layer (not on the top carrier) in the same order and with the edges aligned. Apply four strips of double-faced tape across the parts, and remove the backing. Now place the top carrier in position, and firmly press down on it to adhere the top layer of parts. Lift off the top carrier, and set it aside.

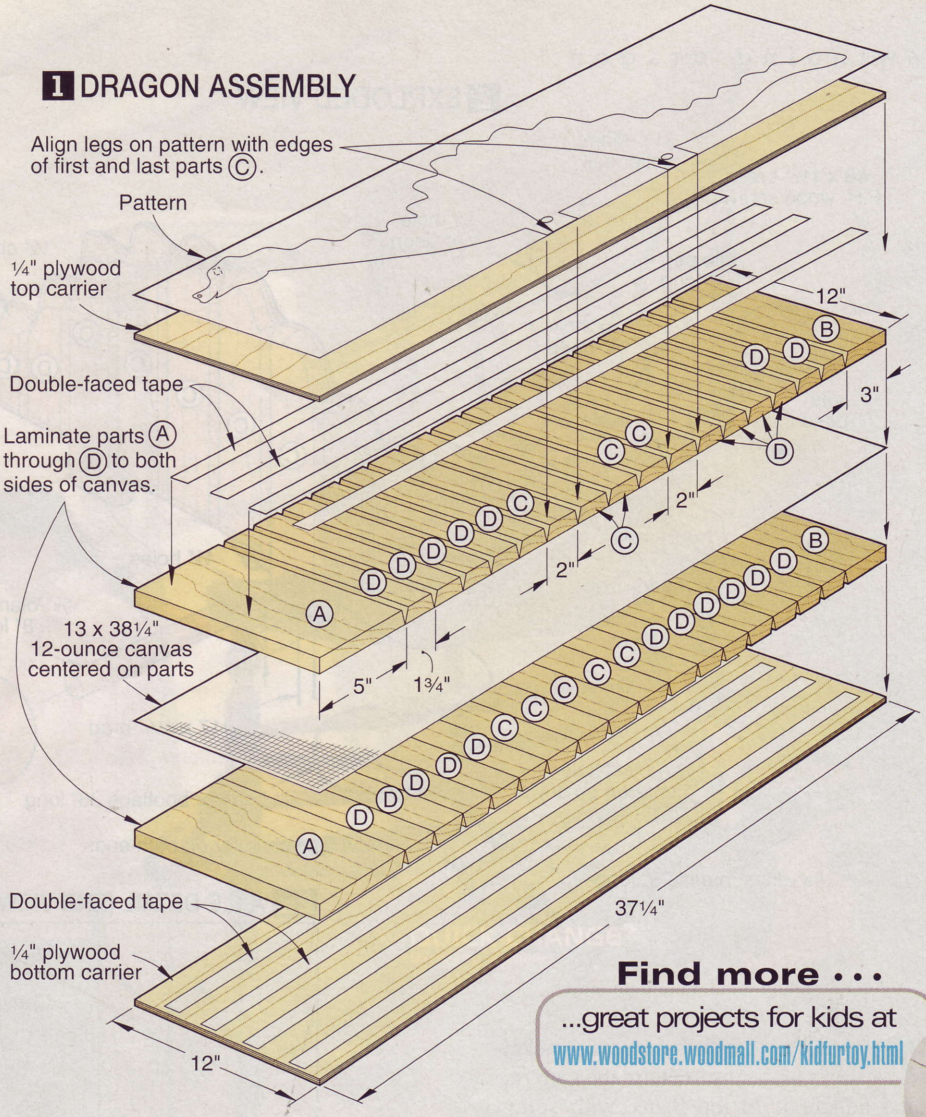
6 Cut a 13×38¼" piece of 12-ounce, unbleached, 100% cotton canvas. (We cut the canvas oversize to allow for shrinkage as the glue dries.) Using a foam paint roller, apply a light, even coat of white woodworker's glue to the exposed faces of the bottom carrier's parts and to one side of the canvas. Center and lay the canvas (glue side down) on the glued parts, and smooth it out.

7 Apply glue to the top of the canvas and to the exposed faces of the top carrier's parts. Position the top carrier on the canvas, making sure the head blanks (A) of both carriers match up. Clamp the assembly as shown in **Photo A**, and let it set overnight.



Clamp the laminated dragon with 2×4s placed on edge to distribute the pressure across the assembly.





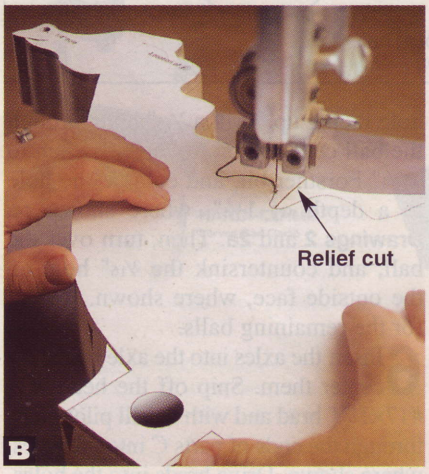
Shape and free the dragon

Note: If you'd prefer a full-size pattern rather than upscaling our gridded pattern, see the Buying Guide at the end of this article for the dragon hardware kit, which includes a ready-to-use pattern.

1 Make a gridded dragon pattern by first taping sheets of paper together to form a 12×37¼" piece. Draw 1" squares across the entire surface.

2 Referring to the quarter-size gridded dragon pattern in the *WOOD PATTERNS®* insert, draw the dragon's outline on your gridded sheet, and mark centerpoints for its nose and wheel-axle holes, and the location for an eye bracket (E). Draw the dragon's outline by first plotting the points where the pattern lines cross the grid lines; then draw lines to connect the points. (A French curve helps in doing this.)

3 Remove the clamps and 2×4s from the laminated assembly. Apply spray adhesive to the back of the pattern, and adhere it to the top carrier, aligning the pattern with the first and last parts C of the lamination, where shown on **Drawing 1**.



When cutting into tight areas, make a relief cut to facilitate waste removal and provide blade clearance for cutting the tight radius.

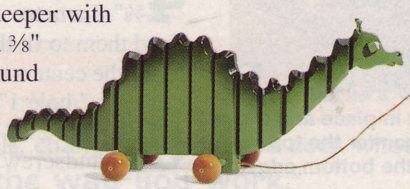
4 With the carriers in place, drill a ¼" hole for the nose and two ⅝" holes for the wheel axles through the carriers and dragon, where shown on the pattern. Then, bandsaw the dragon to rough shape with a ¼" blade. Switch to a ⅛" blade, and cut to final shape, making relief cuts where necessary, as shown in **Photo B**. Using a ½"-diameter sanding drum in an oscillating spindle sander or a drill press, sand the edges to remove the saw marks.

5 Separate the bottom carrier from the lamination, and remove the tape. Chuck a chamfer bit in your router. Starting at the back of the dragon's head and working to its tail, chamfer along its top edges, where shown on **Drawing 2**. To avoid chip-out, make three passes, cutting deeper with each pass. Switch to a ⅜" round-over bit, and round over the dragon's bottom edges, where shown.

6 Reattach the bottom carrier to the lamination with two strips of double-faced tape. Remove the top carrier and the tape. Rout the edges, as you did before, as shown in **Photo C** on *page 98*. Then, remove the bottom carrier and tape, freeing the dragon.

Add the details

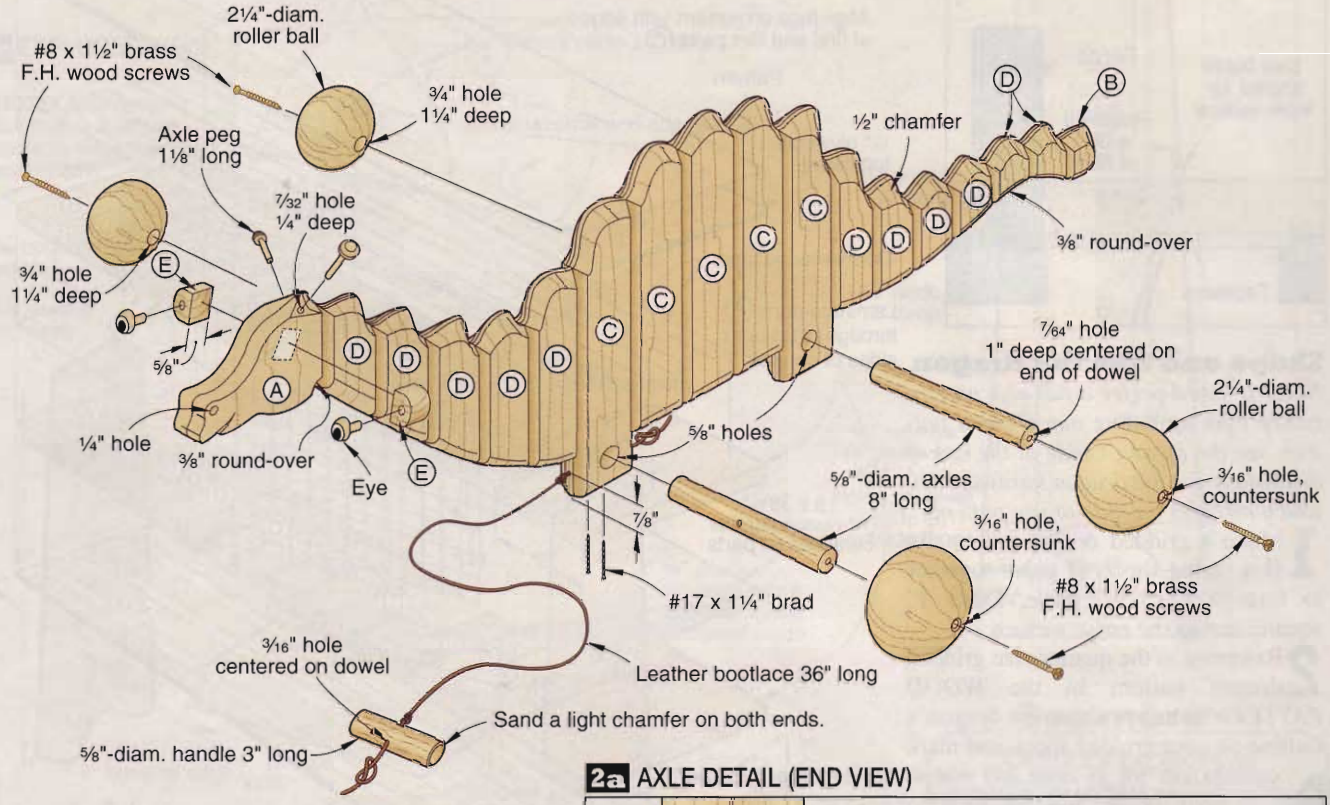
1 Plane the leftover board that you set aside earlier to ⅝" thick. Then, cut a ⅞×6" blank for forming the eye brackets (E).



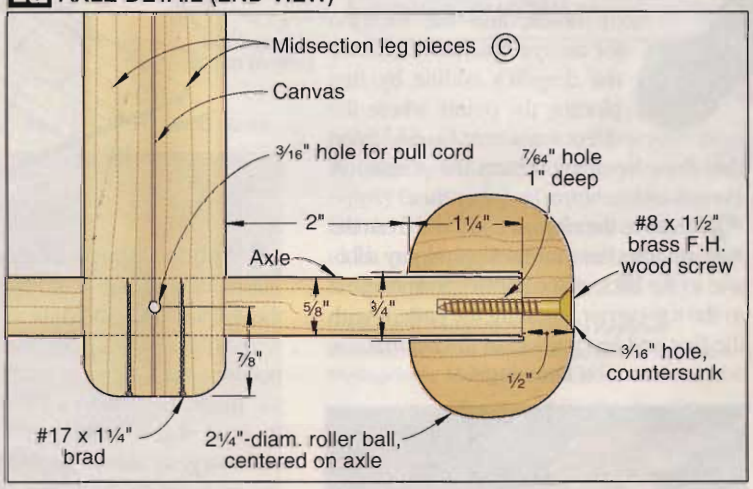
Find more . . .

...great projects for kids at
www.woodstore.woodmall.com/kidfurtoy.html

2 EXPLODED VIEW



2a AXLE DETAIL (END VIEW)



2 Photocopy the full-size eye-bracket pattern in the insert. Trim the pattern, and adhere it to the blank with spray adhesive. Bandsaw and sand the 7/16" radius at each end of the blank, where shown on the pattern. Drill a ¼" hole ½" deep at the centerpoints of the radii. Lightly sand the edges of the blank. Then, crosscut a ⅞"-long eye bracket from each end. Now, glue the brackets to the dragon's head, where shown on **Drawing 2** and on the dragon pattern, with the holes facing forward.

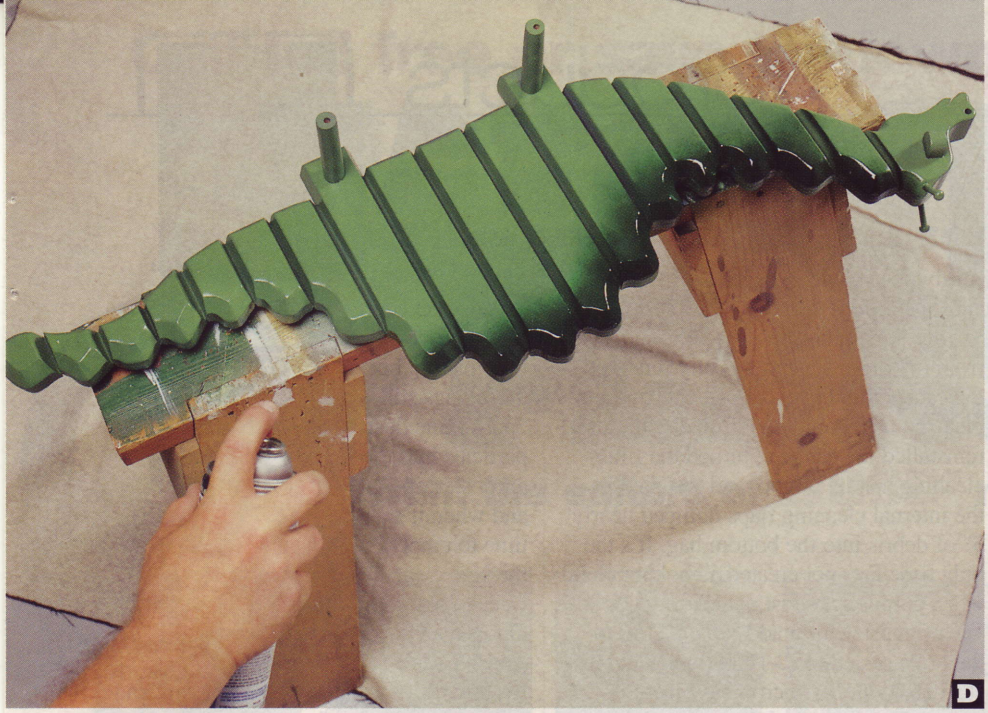
With the bottom carrier in place and the top carrier removed, chamfer the top edges and round over the bottom edges.

3 Drill a 7/32" hole ¼" deep and 90° to the chamfered surface on both sides of the dragon's head for its axle-peg ears, where shown. Glue a peg in each hole.

4 Cut two 8"-long wheel axles from a ⅝"-diameter birch or oak dowel. Sand them to fit the dragon's axle holes. Mark the centers on the axles' ends, then drill a 7/64" hole 1" deep in each end.

5 Clamp a 2¼"-diameter roller ball in a handscrew with the predrilled hole facing up. Drill a 3/16" hole through the ball centered on the hole. Switch to a ¾" Forstner bit, and enlarge the hole to a depth of 1¼", where shown on **Drawings 2** and **2a**. Then, turn over the ball, and countersink the 3/16" hole on the outside face, where shown. Repeat for the remaining balls.

6 Insert the axles into the axle holes and center them. Snip off the head of a #17×1¼" brad and with it drill pilot holes through the ends of parts C into the axles, where shown. Drive brads into the holes, set them, and fill the holes with a wood putty. Sand smooth when dry.



Enhance the dragon's looks by spraying a darker color along the top of its spine on both sides. Allow the overspray to blend in with the base paint.

Finishing touches

1 Sand the dragon to 220 grit, and remove the dust. Apply a latex primer to all surfaces. Sand lightly when dry.

2 Apply two coats of paint. (We used Rust-Oleum's American Accents no. 7934 Leafy Green Satin spray paint.) Let it dry for 24 hours. Then, spray the top of the dragon's spine a darker color, as shown in **Photo D**. (We used Rust-Oleum's Painter's Touch no. 1938 Hunter Green Gloss.)

3 Fit the roller balls on the axles, and drive a #8×1½" brass flathead wood screw through each ball and into the axle. Tighten the screws just enough so the balls turn freely without wobbling.

4 Make a handle by crosscutting a 3" length of ⅝" dowel, chamfering the ends, and drilling a 3/16" hole through the center to receive the leather bootlace, where shown on **Drawing 2**. Drill the same-size hole through the center of the front leg, where shown on **Drawing 2a**. Apply a clear finish to the dowel.

5 Knot one end of a 36" length of leather bootlace, thread the other end through the handle, and knot again behind the handle. Secure the other end of the lace in the hole in the front leg by tying a knot in front of and in back of the leg. Finally, glue the eyes into the eye brackets.

Written by **Owen Duvall** with **Jeff Mertz**
Project design: **Lee Gatzke**
Illustrations: **Mike Mittermeier; Lorna Johnson**
Photographs: **Marty Baldwin**

Keep children *and* the dragon safe

The U.S. Consumer Product Safety Commission recommends that for children under 36 months of age, toys with pull cords longer than 12 inches not have attachments on their ends because they can become tangled, form a loop, and cause serious injury. If a child in this age range will have access to this toy, either omit the dragon's pull-cord handle or keep the cord length to 12" or less. Although this dragon is a tough creature, it does have limitations. Children should avoid picking it up by the end of the tail, as it could tear off.

materials list

Part	FINISHED SIZE T	W	L	Matl.	Qty.
A head blanks	¾"	5"	12"	P	2
B tail blanks	¾"	3"	12"	P	2
C midsection blanks	¾"	2"	12"	P	10
D neck and tail blanks	¾"	1¾"	12"	P	22
E* eye brackets	⅝"	⅞"	⅞"	P	2

*Parts initially cut oversize. See the instructions.

Materials key: P–poplar.

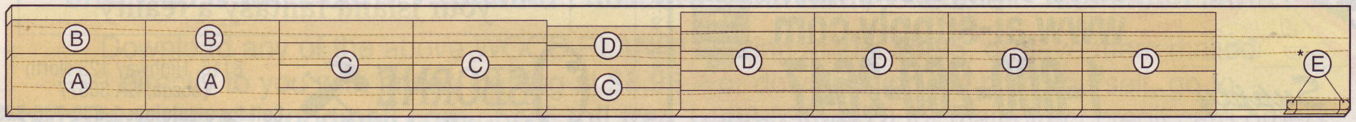
Supplies: ¼×12×37¼" plywood (2); double-faced tape; spray adhesive; foam paint roller; ⅝"-diameter birch or oak dowel, 20" long; #17×1¼" brads; wood putty; 36" length of leather bootlace.

Blades, bits, and other tools: ⅜" round-over bit, chamfer bit, ¾" Forstner bit, ½"-diameter drum sander.

Buying Guide

Dragon hardware kit. Contains a full-size dragon pattern, axle pegs (2), 2¼"-diameter roller balls (4), green eyes (2), 13×38¼" 12-ounce cotton canvas, and #8×1½" brass-plated flathead wood screws (4). Order kit no. 4216, $14.99 plus $3.99 shipping (MN residents add $1.23 tax), from Meisel Hardware Specialties, PO Box 70, Mound, MN 55364. Call 800/441-9870 inside the U.S., 952/471-8550 outside the U.S., or go to www.meiselwoodhobby.com.

cutting diagram



¾ x 9¼ x 120" Poplar *Plane or resaw to the thickness listed in the Materials List.

shop-proven products

These woodworking wares passed our shop trials

Dust collector's filter keeps air cleaner

In an era when home woodworkers are becoming more savvy about protecting their health, Jet Equipment & Tools is taking a big step toward reducing airborne dust with the DC-1100CK dust collector. Perched atop the machine's rim (where you'd normally attach a cloth bag) is a pleated-paper filter canister, wrapped in a protective steel mesh.

The manufacturer says the filter captures dust particles as small as 2 microns in diameter. Most dust-collector bags can't catch particles smaller than 30 microns, so they do little to capture the smallest dust particles most detrimental to your lungs.

Besides filtering smaller, the DC-1100CK also filters longer between cleanings because the pleats have up to six times the surface area of a conventional dust-collection bag. With all that filtration going on upstairs, you don't need a breathable bottom bag, so Jet provides a sturdy plastic bag that you simply tie up and carry to the curb when it's full.

After a marathon session pulling dust from my drum sander, I gently removed the canister and peeked inside to find the pleats almost completely filled with dust. I reinstalled the canister, turned the filter-cleaning handle on top, and watched as the internal cleaning flaps dumped nearly 5" of debris into the bottom bag. It's the only time I've not created a choking cloud when emptying a dust collector.

The canister filter adds about $150 to the price of Jet's DC-1100 (which comes standard with 30-micron bags up and down). That's more than the cost of a set of high-efficiency aftermarket bags that filter down to 1 micron, but those bags still "poof" fine dust particles into the air at startup and when it's time to empty the bag.

Jet's John Otto says the canister itself fits any dust collector with a 20" rim, and sells separately for about $220. It won't fit earlier models of the DC-1100, but Jet sells a retrofit kit for that model that includes the canister, a 20" rim, and a plastic lower bag for $230.

Jet DC-1100CK dust collector

Performance	★★★★★
Price	$450
Value	★★★★☆

Call Jet Equipment & Tools at 800/274-6848, or visit www.jettools.com.

—Tested by Jeff Hall

Continued on page 104

Jein

Blow Out Sale!

Prices good only while supplies last!

Multimaster Kit
#FIN MSXE 636-2
Sale $178.00
Multimaster Sander Only
#FIN MSX636
Sale $128.95

Mini Turbo Vac
6 Gallon Capacity, 8 amp Motor, Extremely Quiet
#FIN 9-11-20
Sale $138.95

Turbo II Dust-Free Vac
Wet/Dry Vac, Auto On/Off Trigger, Extremely Quiet
#FIN 9-55-13
Sale $208.90

Turbo III Vac
Two-stage motor, 19 Amp Tool Outlet, Quiet
#FIN 9-77-25
Sale $287.90

FREE Shipping!

A&I Supply

Get Our Catalog or Shop Online:
www.ai-supply.com
1-800-260-2647

Circle No. 1402

Fantasy Islands...

Have a great design idea for a Kitchen Island?

Osborne Wood Products, Inc. offers a variety of island legs to help make your island fantasy a reality.

OSBORNE Wood Products, Inc.
www.osbornewood.com

8116 Highway 123 North
Toccoa, GA 30577
Call for a catalog: 1-800-746-3233
Order line: 1-800-849-8876
Español: 1-877-445-6034

Circle No. 1979

Circle No. 835

shop-proven products

It's like hotmelt glue on steroids

HiPURformer Advanced Bonding System, may look like fancy hotmelt glue, not intended for serious joinery, but don't be fooled. This waterproof polyurethane adhesive applies like hotmelt but bonds more like epoxy.

HiPURformer adhesive cartridges drop into a caulking-gun-like applicator that heats the glue when placed in the system's base. After 10 to 15 minutes of heating, the glue softens into a clear goo that flows easily. Three formulations offer different working times: WW30 and WW60 bond wood to wood with 30- and 60-second open times. MP75 is a multipurpose adhesive with a 75-second open time.

My first test was edge-joining two pieces of walnut that I had back-beveled to create a gap at the back of the joint. I applied a bead of WW30, held the pieces together for 30 seconds, then set the assembly aside. After 10 minutes, in spite of the purposeful gap, the joint proved exceptionally strong. By the next day, I couldn't break it with my bare hands.

Next, I glued two pieces of white oak, end grain to end grain, using WW60. This joint is tricky to clamp, so I just pressed it together by hand for a minute and let it cure for 10 more. I then rip-cut and routed the joint, with no ill effects. In less than 15 minutes, I had glued and machined a joint that's virtually impossible for other adhesives to even make. Again, the bond was virtually unbreakable.

Because of the adhesive's heavy viscosity, I had to be careful to avoid a visible glue line. However, HiPURformer adhesives contain a fluorescent dye that shows up under ultraviolet light to help find drips you might miss. I removed squeeze-out with my fingernail a few minutes after gluing the joint. Wait much longer, and you'll need to machine away the excess.

As impressed as I am by this glue, the short open times mean you won't be using it on large glue-ups. And Nate Miles of Franklin International says the glue becomes less effective after going through as few as 16 heating cycles. But HiPURformer provides a super-strong bond without screws or nails—a big plus when working with hard-to-clamp assemblies or easy-to-split materials, such as fragile moldings or picture frames.

HiPURformer Advanced Bonding System

Performance	★★★★★
Price	$100 (system, including 3 adhesive cartridges); additional cartridges, $8
Value	★★★★☆

Call Franklin International at 800/347-4583, or visit www.titebond.com.

—Tested by Jeff Hall

Continued on page 106

Router delivers on table-mounting promise

About two years ago, we got a sneak peak at a prototype of Bosch's 1619EVS 3¼-hp plunge router. The machine promised some neat features that make it particularly well-suited to table-mounting. After several delays in getting to market, I finally got my hands on one, and found that it lives up to its pre-release hype.

The 1619EVS offers all of the good things I've come to expect in a Bosch router: a powerful soft-start motor (15 amps), variable speed (8,000–21,000 rpm), and electronic speed control that senses an increased load and pumps more power to the motor to maintain constant bit speed. I found the power switch and plunge-lock release operable without having to take my hands off the comfortable soft-grip handles.

But the thing that makes this router truly unique is the ability to disable the plunge lock and springs for router-table use. With the plunge springs disengaged, I didn't have to fight that extra pressure when raising the bit. It takes only a few seconds and no tools to release the springs and, when I'm ready to return the router to handheld mode, they instantly snap back into place.

The depth-adjusting knob locks out for large changes, then locks back in to fine-tune the cutting depth. And, like other Bosch plunge routers, that knob hugs the motor housing, allowing me just enough finger room for only about ¼ turn at a time. Currently, an extension knob that alleviates this inconvenience comes with the router, and that's a big bonus.

The 2" subbase opening accepts Porter-Cable-style guide bushings using the quick-release adapter that comes with the router. Removing the subbase reveals a gaping 3¾" base opening that'll handle any router bit you can buy. That big hole also makes it easier to change bits from above the table.

—Tested by Jeff Hall

Bosch 1619EVS Plunge Router

Performance	★★★★★
Price	$330
Value	★★★★☆

Call Bosch at 877/267-2499, or visit www.boschtools.com.

Continued on page 114

We've Been Busy in Our Workshop, So You Can Be More Productive in Yours!

Grand Rabbet Set, #835.503.11

New CMT Router Bit Sets

We never run out of great ideas for router bit sets. Check out our new **Grand Rabbet Set**, or our doormaking

Junior Panel Set, #800.522.11

Divided Light Set, #800.525.11

bit collections from Marc Sommerfeld and Lonnie Bird. These beautiful boxed sets are always a super gift idea!

New CMT Industrio™ Routing System

Our router table just keeps getting better! Ask your CMT Distributor for all the new features & details!

New Industrio Routing System #999.500.02

New ITK Blades

Manufactured with the finest carbide and steel, these blades set new standards for quality. Ask your dealer about the great values on blade packages!

New Insert Shaper System

With 13 pairs of M2 steel knives and a high-strength aluminum cutterhead, these sets are a terrific value. Additional knives are available in over 170 profiles!

Get all the details about CMT's exciting new tools, and start having more fun in your shop.

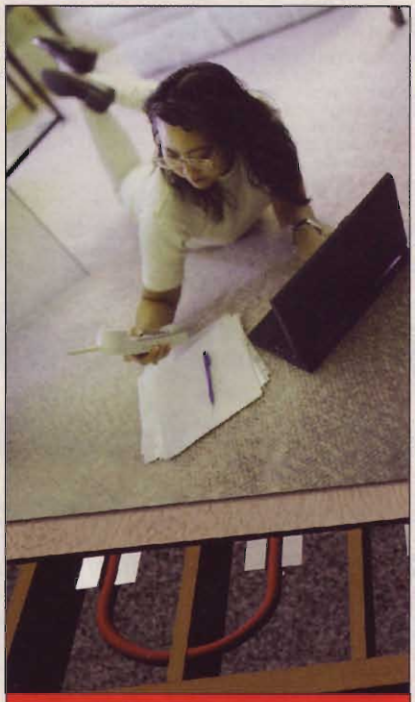
CMT the only ORANGE one™

Visit your **CMT Distributor** today! Call 888-268-2487, or visit www.cmtusa.com

CMT USA, Inc. • 307-F Pomona Drive • Greensboro, NC 27407 • **888-268-2487** • Visit our website at **www.cmtusa.com**

Circle No. 180

Your Hands. Your Tools. Your Family's Comfort.



Most affordable " Do it yourself " Radiant Floor Heating system on the market!

You can put it all together with a Radiant Floor Company underfloor heating system.

We give you all the information and our technicians work WITH you to design a system to suit your needs.

Our installation manual is packed with dozens of labor saving tips.

For use with a domestic water heater or boiler. Call for a free quote.

We take the mystery out of Radiant Heat.

Visit our website and see how simple and affordable it can be.

www.radiantcompany.com
Toll Free 1-866-WARM-TOES
1-866-927-6863 · 1-802-525-1132

RADIANT Floor Company

GAS, PROPANE, SOLAR, OIL, WOOD, ELECTRIC, GEOTHERMAL

Toll free customer assistance · Free Design Service · Free Brochure · Low Prices

Veritas® Apron Plane

This is a plane that "comes to hand" like no other. It is well suited to all manner of light trimming and fitting where you might otherwise reach for a chisel. At 5½" long and 14 oz, it feels like an extension of your hand. The tough ductile iron body will survive the accidents a frequently used tool encounters. The 1¼" wide high-carbon steel blade, hardened to Rc60-62, is 25% thicker than most block plane blades. Also available with an A2 tool steel blade. Setting is easy and accurate with the combined feed and lateral adjustment mechanism. A welcome gift for any woodworker.

05P27.01W HCS Blade $59.00
05P27.02W A2 Blade $67.00

1-800-683-8170
Shop online:
www.leevalley.com

Lee Valley & veritas
Lee Valley Tools Ltd., 814 Proctor Ave., Ogdensburg, N.Y. 13669

shop-proven products

12-volt cordless drill works like an 18-volter

After testing a raft of 18-volt cordless kits (*WOOD*® magazine, issue 137), I got used to having lots of power at my fingertips, so I didn't expect to be too impressed by a 12-volt drill. But Makita's 6317DWDE M-Force drill changed my mind.

Using a 2" Forstner bit, this 4.4-pound drill bored twelve holes through ¾" red oak on a single charge, making it nearly as productive as the top 18-volt tool in the cordless-kit test. I found no evidence of bit slippage during this tough test, a fact I attribute to the 6317DWDE's ratcheting, serrated-jawed chuck.

Makita engineers added a unique feature to the entire line of M-Force drills: a switch that instantly locks the chuck clutch into "drill" (no-slip) mode without having to change the clutch setting on the nose. That means you don't have to remember which of the 6317DWDE's sixteen clutch settings you were using to drive screws after you drill the next hole.

Despite these improvements to the tool, and upping run times with a pair of 2.6 amp-hour, nickel-metal hydride batteries, Makita has held the line on price. The 6317DWDE with its ½" chuck sells for $180, the ⅜"-chuck 6217DWDE for $170—about the same price as Makita's 12-volt drills from three years ago.

—Tested by Garry Smith

Makita 6317DWDE cordless drill

Performance	★★★★★
Price	$180
Value	★★★★☆

Call 800/462-5482, or visit www.makitatools.com.

Continued on page 118

Pocket the time saved with a K2000 Kreg Jig

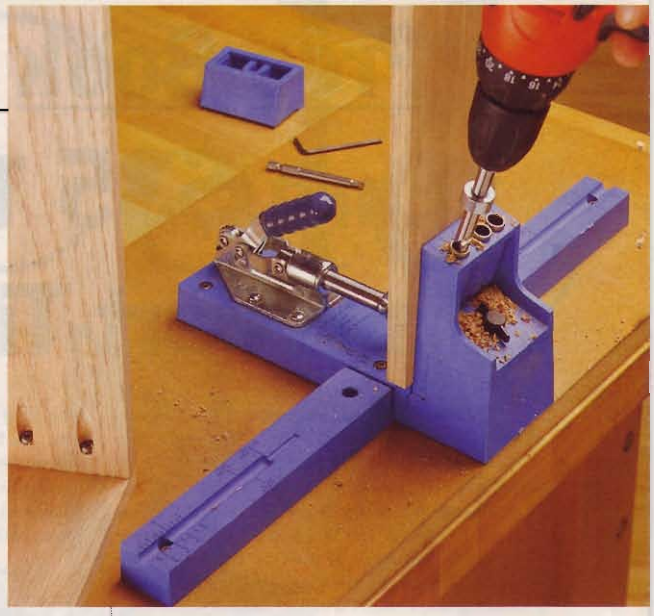
I'll be honest with you: Until I tested the Kreg 2000 ProPack, I'd kept a healthy distance from the idea of pocket-hole joinery. It might be fine for production shops, but I was skeptical about the benefits for the average woodworker. No more.

"Kreg Jig" is to pocket-hole jigs what Kleenex is to facial tissue, and the original all-metal Kreg Jig was designed to work primarily with ¾" stock. Although the K2000 Kreg Jig is primarily plastic with hardened-steel bit guides, it's worthy of the Kreg name. Besides centering the screw hole in ¾" stock, the K2000 adjusts quickly to create pocket holes in ½" or 1½"-thick stock. The support wings on the jig even have index marks for instantly setting the stop collar to the correct depth for the different thicknesses.

I used the K2000 to attach 2" oak trim to the edge of a 1½"-thick audio console I built recently. Never having attempted pocket-hole joinery, I was surprised at how quickly I became proficient at attaching and using the jig. In fact, the more I played with it, the more uses I found for it, including joining face frames and gluing up edge-joined panels without clamps.

The K2000 Kreg Jig comes as part of Kreg's K2000 ProPack that includes everything you need, including a starter pack of self-tapping pocket-hole screws. It also comes with the Kreg Jig Mini—a tiny guide for putting a pocket hole where the big jig is too large to be of service.

—Tested by Raleigh Rubenking



Kreg ProPack, including K2000 Kreg Jig

Performance	★★★★★
Price	$140
Value	★★★★☆

Call Kreg Tool Company at 800/447-8638, or visit www.kregtool.com.

About our product testers

Garry Smith *is a machinist, and* **Raleigh Rubenking** *is an electronic engineer.* **Jeff Hall** *teaches woodworking and other technical skills to high-school students. All are avid woodworkers.*

Perfect Dust Collector. Perfect Gift.
Holiday Special!
NEW! 1.5 & 2hp Component Systems
$ 599 - $ 943 (Systems Only)
FREE duct design with $50 purchase!
Filter Bags
External Cartridge
No Filter
Internal Cartridge
Gift Certificates Available!
FREE Product and Ductwork Catalog!
1-800-732-4065
www.oneida-air.com
Oneida Air Systems, Inc. 1001 W. Fayette St. Syracuse, NY 13204
Oneida Air Systems
Proudly Made in the USA
Circle No. 2039

WOOD MALL®
THE INTERNET'S LARGEST SOURCE FOR WOODWORKING TOOLS AND SUPPLIES
28 STORES!
MORE THAN 50,000 PRODUCTS!
One-Stop Shopping for Tools and Supplies!
For WOOD MALL advertising information, contact Marlen at: mkemmet@mdp.com
www.woodmall.com

what's ahead

in the March issue of *WOOD*® magazine (on sale January 21)

Country classics and a lot more

Projects

Step-back country cupboard

Follow along step by step as we show how easy it is to build this traditional furniture piece in solid wood. In case you want to build only the bottom—as a sideboard—the instructions point the way.

Teddy-bear intarsia

Another great design from intarsia master Judy Gale Roberts, this 7½×10½" wall-hanging adds charm to any child's room.

Tool cabinet on casters

Save yourself a lot of legwork by rolling oft-used tools right up to your work area. Doors on both sides open wide for access, then close tight for rolling and compact storage.

The ultimate baker's pastry set

Top chefs told us what they wanted in this design: no-slip counter cleats, common pastry-diameter markings, a French-style rolling pin, and a handy hanger. This project delivers splendidly on each count.

One fishy puzzle

This colorful character is as fun to look at as it is to take apart and reassemble.

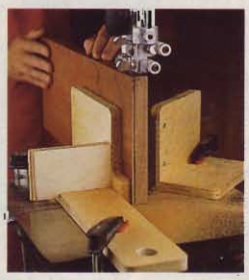
Tools, Techniques, & Features

A look at lathes

With the help of woodturning whiz Phil Brennicm, we reduced the better part of a tree to shavings in a quest to find today's best lathes priced from $300 to $900.

Achieving perfection in pine

See how to deal with all of those knotty problems peculiar to pine, such as its preponderance of pitch and hard-to-stain surfaces.



Master resawing

Cut through thick and thin in any wood using these bandsaw and tablesaw techniques.

Country craftsman

Meet (and learn from) Bill Draper, a man who started small, then hit the big time producing country furniture and cabinetry.